THE ARCHEOLOGY AND STABILIZATION OF THE DOMINGUEZ AND ESCALANTE RUINS

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BUREAU OF
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SERIES

No. 7

THE ARCHEOLOGY AND STABILIZATION OF THE DOMINGUEZ AND ESCALANTE RUINS

PART I

The Dominguez Ruin:
A McElmo Phase Pueblo in Southwestern Colorado

by
Alan D. Reed

PART II

Archeological Excavation at the Escalante Site,
Dolores, Colorado, 1975 and 1976

by
Judith Ann Hallasi

PART III

Stabilization of Escalante Ruin 5MT2149
and
Dominguez Ruin 5MT2148
Dolores, Colorado

by
Adrian S. White
and
David A. Breternitz

Colorado State Office
Bureau of Land Management
1979

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FOREWORD

The purpose of this volume of Colorado's cultural resource series is to present to the archeological profession and other interested persons the exciting results of some recent research in Southwestern Colorado. One of the sites reported on in this volume may be the site Father Escalante referred to in his journal of 1776. If this is the case the Escalante site is the first recorded archeological site in what is now the State of Colorado.

If it had not been for the celebration of America's Bicentennial the Dominguez and Escalante sites probably would not have been excavated, studied, and stabilized. These sites were originally to be excavated primarily for interpretive purposes, but as work began it became obvious that these two sites were not typical of other archeological values in the area. The results of those excavations, which are reported here, have expanded our knowledge of Chacoan trade systems and suggested new theories about the status of people in the prehistoric Anasazi culture of Southwestern Colorado.

I am very pleased to make this seventh publication in cultural resources available to the public and the professional community.

Dale R. Andrus

DALE R. ANDRUS
State Director
Colorado
Bureau of Land Management

DESIGNED BY: LEIGH WELLBORN

THE DOMINGUEZ RUIN:

A McELMO PHASE PUEBLO IN SOUTHWESTERN COLORADO

by

Alan D. Reed

with Appendices by

Linda J. Scott

and

Meredith H. Matthews

PART I

Cultural Resource Series No. 7

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ACKNOWLEDGEMENTS

Many individuals have aided in the preparation of this report, to whom I am indebted. They helped to make this undertaking both educational and, for the most part, pleasurable.

I am especially grateful to the members of my committee, Drs. David A. Breternitz, Jack E. Smith, and Deward E. Walker, Jr., for their many helpful criticisms concerning this report. To Dr. Breternitz, who served as my advisor, and Dr. Smith, I extend my heartfelt thanks for guidance, encouragement, and for productive archaeological employment. Dr. Douglas Scott, who provided me with my first field experience, also deserves special thanks.

Field crew members who participated in the 1976 excavations were Jay Dickinson, Janet Eidsness, Woody Farr, Jerry Fetterman, Meredith Matthews, and Paul Roebuck. Helpful advice on excavation procedures and interpretations was offered by James A. Lancaster, Dr. Breternitz, Joel Brisbin, and Kent Leidy. Laboratory analysis was directed by Kellie Masterson. Bertrand de Peyer handled the photography and darkroom work for the project.

Special assistance was offered by Malcolm Withers, who helped analyze the shell material, and Lorraine Shupe, Supervisor of the X-ray Department at the Student Health Center, who did X-ray work on the burials. Robert Carpenter, Roger Cichorz, and Keith Grossaint donated time from their work at Rockwell International to perform mass spectrometer and infrared analysis of the adhesive specimens. Dr. Robert Bye, an ethnobotanist at the University of Colorado, kindly donated lac samples for the infrared and mass spectrometer studies. Dr. Paul Nickens was helpful in teaching me some of the basic techniques in human skeletal analysis. Also, Drs. Charles Love and John Love aided in the identification of mineral specimens.

I am grateful to Meredith Matthews and Linda Scott for their respective bulk soil and pollen reports, included as appendices to this report. The typist of the final draft, Penny Kokora, saved me countless hours of frustration.

To my family, friends, and office partners, I also extend special thanks. These people provided the support, humor, and perspectives that so greatly contribute to any endeavor.

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CHAPTER I
INTRODUCTION

During the summer of 1976, the Dominguez Ruin (5MT2148) was excavated under the direction of the Mesa Verde Research Center. The excavation was requested by and funded by the Bureau of Land Management, under Contract Number 52500-CT5-1044, with the intention of developing an archaeological park to allow for public interpretation of the impressive Escalante Ruin and other smaller nearby ruins. The Dominguez Ruin was selected for excavation and stabilization because of its proximity to both U.S. Highway 147 and the Escalante Ruin, and also because it was hoped that its excavation could demonstrate the relationship between the large and architecturally preplanned Escalante Ruin and the small and relatively simple yet contemporaneous surrounding sites. This relationship is of special interest in that the Escalante Ruin is considered a "Chacoan outlier" (Nemetz 1977), that is, a site-unit intrusion emanating from the Chaco Canyon area of New Mexico, and the Dominguez site is, in most ways, a typical Mesa Verde area site. The relationship between the indigenous and the intrusive sites has not been satisfactorily studied, even though "Chacoan outliers" have been identified for some time (e.g., Martin 1936; Morris 1919). At present, there have been at least 21 "Chacoan outliers" identified in the Four Corners area (David Breternitz, personal communication), six of which are located in southwestern Colorado. It is the intention of this report to examine the nature of the relationship between the "indigenous" Mesa Verde sites and the "Chacoan outliers", and to determine how this relationship might affect our concepts of Anasazi socio-political organization.

The Dominguez site consists of a block of 4 rooms and a small kiva. A trash mound, which had been located to the south of the kiva, had been bulldozed away during the construction of a power line some years earlier. On the basis of its architecture, dendrochronological dates, and material culture, the site has been assigned to the McElmo Phase of the Pueblo III Period (Table 1) of the Anasazi culture. Due to the small size of the site and the plan for its complete stabilization, the Dominguez site was excavated in its entirety. Dr. David A. Breternitz was the overall supervisor of the excavation, and students of the University of Colorado provided the labor.

Previous Work in the Area

An awareness of the archaeological resources in the immediate area of the Dominguez Ruin began in 1776. In that year, a small party of explorers led by two Franciscans, Fray Silvestre Velez de Escalante and Fray Francisco Antanasio Dominguez, passed through southwestern Colorado while searching for an overland route connecting Santa Fe with Spanish settlements along the Californian coast. On August 12, 1776, the expedition set up camp near the present town of Dolores, Colorado, near the Dolores River. The party remained in camp the following day, in order to calculate their exact location and to allow Father Dominguez to recover from a recent bout with an illness. While Dominguez rested, Father Escalante explored the immediate area. Escalante wrote that "on an elevation on the south bank of the river in ancient times there was a small settlement of the same form as those of the Indians of New Mexico, as shown by the ruins which we purposely examined" (Bolton 1972:28).

This site eventually became known as the Escalante Ruin. 5MT2148 was in 1976 named the "Dominguez Ruin" in honor of the

Table 1: Mesa Verde area cultural sequences (from Gillespie 1975).

Date A.D.	Pecos classification	Phase sequence (Hayes 1964)
1300		Mesa Verde
	Pueblo III	
1100		McElmo
	Pueblo II	Mancos
900		Ackmen
	Pueblo I	Piedra
700	Basketmaker III	La Plata
	Basketmaker II	
300		

Franciscan explorer who stayed behind at camp.

J. Walter Fewkes, the renowned archaeologist of the Southwest during the first part of this century, apparently did some work in the area of the Escalante Ruin, as he realized the historical significance of the first Indian ruin recorded by a white man in Colorado. He published a description of the site in 1919 (Fewkes 1919).

In 1970, the University of Colorado Archaeological Center, under contract with the Bureau of Land Management, recorded the Escalante and Dominguez sites, as part of an archaeological survey and inventory of BLM cultural resources.

During the summers of 1975 and 1976, the Mesa Verde Research Center, under the direction of Dr. David A. Breternitz, conducted excavations and stabilization at the Escalante Ruin. Approximately one-third of the site was excavated. At the time of this writing, Judith Nemetz, a student of the University of Colorado, is completing a report of the excavations.

The Setting

Geography and Geology

The Dominguez Ruin is situated at the southern base of a large hill at an elevation of 7,100 feet above sea level. The hill, upon which the Escalante Ruin is located, overlooks the Dolores River to the northeast as it meanders from its headwaters in the San Miguel Mountains of Colorado towards its confluence with the Colorado River in eastern Utah (Fig. 1). The Dolores River is one of the largest rivers in southwestern Colorado, comparable in size only to the San Juan and the Animas Rivers.

In the vicinity of the Dominguez Ruin, the Dolores River has

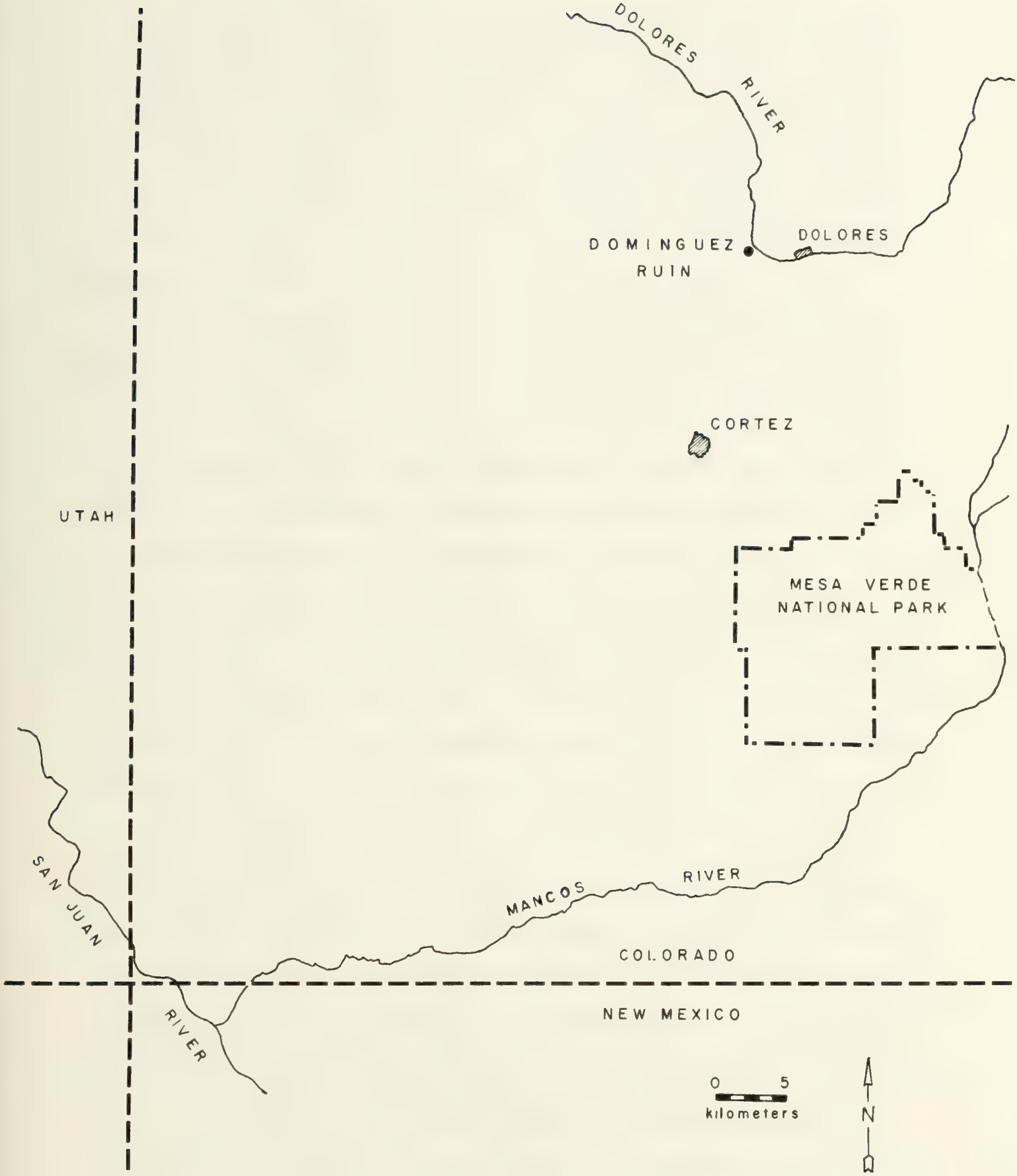


Figure 1. Location of the Dominguez Ruin in southwestern Colorado. The Escalante Ruin, not shown here, is 150 meters to the north of the Dominguez Ruin.

deposited a broad flood plain of Quaternary alluvial material which, in places, is over one-half kilometer wide and bounded by rolling hills and numerous tributary drainages. Some benches and hills along the river maintain Quaternary alluvial and eolian deposits. Within 5 kilometers to the north, the Dolores River Canyon and tributary canyons deepen substantially, and relief between the flood plain and the top of the surrounding hills may be several hundred feet. The hills surrounding the Dolores River in the vicinity of the Dominguez Ruin are generally of lesser relief. The river's downcutting and other erosional factors have primarily exposed two formations. The hill upon which the Escalante Ruin is located, outcroppings of the Dakota and Burro Canyon Formation and the Mancos Formation occur. The Dakota and Burro Canyon Formation is the predominant stratum in at least a 5 km. radius around the site. This formation is Lower Cretaceous in age, and, according to Haynes _et al_. (1972), consists of predominantly yellowish-brown to gray quartzitic sandstone and some conglomeritic sandstone in thick beds, with small layers of impure coal, gray claystone, shale, and gray friable carbonaceous sandstone interbedded with the more massive strata. This formation averages 100 feet thick, and is easily visible along the northeastern slope of the hill atop of which the Escalante site is located. On the southern slope of this hill, just above the Dominguez site, the Cretaceous-age Mancos Shale outcrops. This is a marine clayey shale that is highly fossiliferous, gray in color, and fragments into thin tabular spalls at outcrops. The Mancos shale contains a few layers of calacareous sandstone and sandy clayey limestone in its lower portions, and grades vertically into and intertongues with the formations of the Mesaverde Group (Haynes _et al_. 1972). The Mancos Formation reaches 2,000 to 3,000 feet in thickness in some parts of Montezuma County. The hillside soils,

that in most places overlie the two formations mentioned above, are of the Camborthids-Torriorthents-Haplargids association (Colorado State University Experimental Station et al. 1972). This soil type is characterized as a warm, dominantly shallow and well drained soil located on steep hillsides, benches, and canyons.

Immediately south of the Dominguez Ruin, the hills surrounding the Dolores River give way to much more gently rolling hills. These hills are covered with a deep layer of reddish-brown loess, which are Quaternary eolian deposits. This soil can probably be considered a Haplargid soil (Colorado State University Experimental State et al. 1972), in that it is on a gentle slope and is well drained. The soil is suitable for cultivation, and presently is extensively farmed. The gently rolling hills are dissected by intermittant drainages that develop and deepen to the southwest. The drainages eventually enter McElmo Creek near the town of Cortez, Colorado. These canyons expose the Upper Jurassic Brushy Basin member of the Morrison Formation. This member is comprised of a bentonitic mudstone, with a few lenses of a distinctive green and red chert-pebble conglomeritic sandstone interspersed (Haynes et al. 1972).

Flora

The Dominguez Ruin is located approximately at the border of the Upper Sonoran and the Transition life zones (Armstrong 1972). The vegetation in the immediate area of the Dominguez Ruin is diverse, partially because of soil disturbances caused by recent and prehistoric peoples. Atop the site itself and to the south in the area of construction and cultivation disturbances, cheat grass (Bromus tectorum), Indian Rice-Grass (Oryzopsis hymenoides), sunflower (Helianthus annuus), thistle (Cirsium), bindweed (Canvolvuls arvensis), goosefoot (Chenopodium sp.), poison milkweed

(Asclepias suberticillata), salisfy (Tragopogon pratensis) and globe mallow (Sphaeralcea coccinea) grow abundantly. Many other weeds associated with disturbed soils were also observed, but not identified. Big sagebrush (Artemisia tridentata), and Gambel's oak (Quercus gambelii) dominate the flora in this area.

Along the slope of the hill to the north of the site is an undisturbed Pinon and Juniper forest. Along with the pinon (Pinus edulis) and juniper (Juniperus osteosperma) grow squaw apple (Peraphyllum ramosissimum), serviceberry (Amelanchier utahensis), fendlerbush (Fendlera rupicola), bitterbush (Purshia tridentata), rabbitbrush (Chrysothamnus nauseosus), mountain mahogany (Cercocarpus montanus), and broad leaf yucca (Yucca baccata). This list is by no means exhaustive.

Fauna

The diverse environmental niches in the area of the Dominguez Ruin support a plethora of faunal types. Members of the field crew observed mule deer (Odocoileus hemionus), cottontail (Sylvilagus sp.), skunk (Mephitis mephitis), rock squirrel (Citellus variegatus), chipmunk (Eutomias quadrivittatus) and a variety of birds and reptiles. Undoubtedly, coyote (Canis latrans), several species of mice (Peromyscus sp.), badger (Taxidea taxus), porcupine (Erethizon dorsatum), and black tailed jackrabbit (Lepus californicus), also inhabit the area. Elk (Cervus canadensis) may be seasonal migrants to the area. Pronghorn antelope (Antilocapra americana) probably roamed the Montezuma Valley in prehistoric times, as did wolves (Canis lupus) and bison (Bison bison) (Steven Emslie, personal communication).

Climate

The U.S. Weather Bureau collected climatic data in the town

of Dolores, Colorado, from 1908 until 1952. Dolores is located approximately 2 miles east of the Dominguez Ruin, at an elevation of 6,942 feet--approximately 150 feet lower in elevation than the site. Between 1908 and 1952, the average annual precipitation amounted to 47 cm, with definite peaks occurring in the months of December and January, in March and April, and in August and September. The mean annual temperature for the town of Dolores is approximately 46 degrees Farenheit. The temperature at the Dominguez site may average somewhat higher than the town of Dolores, however, in that the site is not situated in a valley as is Dolores. Cold air tends to drain off hills and mesas and into the canyons, thereby allowing the elevated land to be somewhat warmer. The town of Dolores between 1909 and 1927 averaged 128 days of growing season per year, that is days between the last killing frost of spring and the first killing frost of autumn. The vicinity of the Dominguez Ruin may average a few more days of growing season per year. That corn can presently be raised in the Dominguez site area seems certain. Corn, without the benefit of an irrigation system, requires a growing season of 120 days, 26 to 30 cm. of annual precipitation including 11 to 15 cm. of rain in the summer, and sufficient winter and springtime moisture to allow for germination (Winter 1976). The Dolores area meets all of these requirements. Pollen and archaeo-botanical studies indicate that the climate in the 12th and 13th centuries was essentially the same as today (Erdman et al. 1969:57; Scott, Appendix A, this volume).

Discussion

Even from this brief discussion of the environment in the immediate vicinity of the Dominguez Ruin, it should be apparent

that there is today, and probably was prehistorically, a diversity of resources available for exploitation. The rolling hills south of the Dominguez site are suitable for cultivation. The Dolores River provides aquatic resources and an area attractive to wildlife, and further, the hills surrounding the river and the many tributary canyons provide a variety of niches for floral and faunal communities.

CHAPTER II
ARCHITECTURE

Introduction

At the time of initial archaeological investigations at the Dominguez Ruin, in the summer of 1976, archaeologists found a rubble mound badly overgrown with Gambels oak, serviceberry, and other brush. Very few surface artifacts were visible, and no depression indicative of a subterrainean kiva was present. The site's location at the base of a hill had facilitated rapid post-occupational deposition of alluvial soils onto the site.

After the brush was cleared from the site, the rubble mound and a few surface artifacts were mapped via an alidade/planetable and a metric tape. This combination was employed throughout all phases of the excavation. When the initial mapping was complete, a grid system of one meter squares was superimposed over the site in order to facilitate horizontal control, especially necessary outside of the roomblock. A primary datum, set at the highest point of the site, was the locus for vertical as well as horizontal control.

Employing the grid system, a test trench was excavated south of the rubble mound in search of the kiva. When a portion of the kiva was discovered, other grid squares were excavated to delineate the orientation and the extent of the kiva. When this was done, the grid system was abandoned for the remainder of the kiva excavation. The kiva was divided approximately into halves, and excavated, one half at a time. This technique exposed a continuous profile of the natural stratigraphy across the entire kiva when the first half was completely excavated. From the stratigraphic profile, we were able to determine the sequence of events

after the kiva was abandoned, and to take pollen and bulk soil samples. The pollen samples were taken in vertical increments of 10 cm., and the bulk soil samples were taken from features such as firepits and from the natural stratigraphic levels. Both types of samples were taken frequently throughout the site, and the results of their analysis are presented as appendices to this volume.

Excavation of the roomblock began with the placement of a test trench into the north end of the rubble mound, with the intention of encountering the north exterior wall of the pueblo. When this was accomplished, the wall was followed via a 1 meter wide trench until the entire site was outlined. Small shallow trenches were then dug inside the roomblock itself, following the known walls until all interior walls were discovered. Secondary datums were then set into the corners of each room. Rooms 2, 3, and 4 were divided into quadrants and excavated a quadrant at a time, with the first quadrant being excavated in arbitrary 10 cm. levels until the floor was reached. The natural stratigraphy of the resulting soil profile in each room was studied, and the remainder of the fill in the rooms, save for a small stratigraphic column, was excavated according to the natural stratigraphy. Pollen and bulk soil samples were taken from the stratigraphic columns; the columns were then mapped, and removed.

A backhoe was used in the excavation of the second half of the kiva and portions of the plaza area. These areas were carefully tested beforehand, so the potential for unnecessary destruction was minimal. The local operator was most proficient, and far more benefit was obtained from his services than damage.

General Roomblock Construction

In its final form, the roomblock of the Dominguez Ruin con-

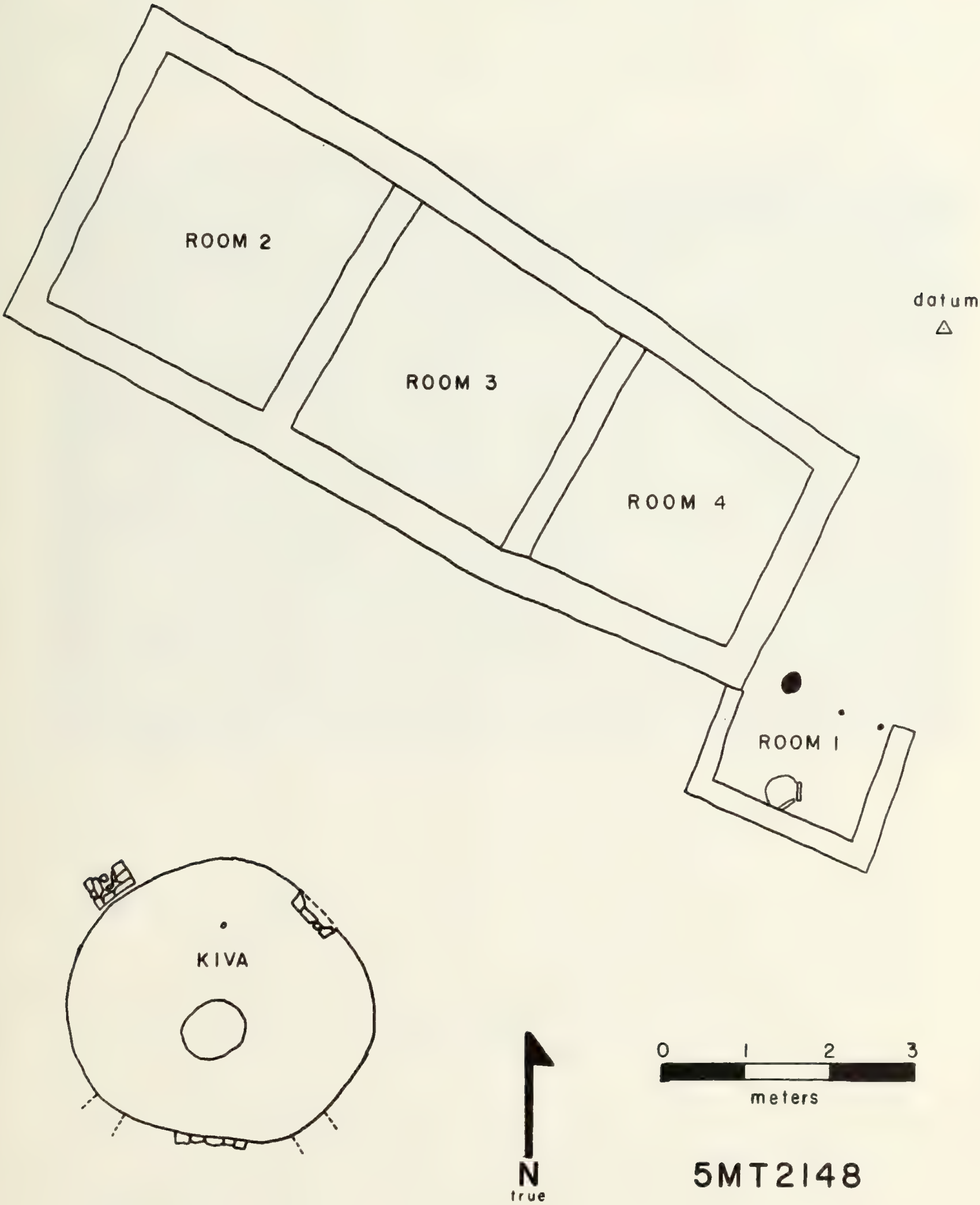


Figure 2. Architectural plan of the Dominguez Ruin.

sisted of four contiguous rooms, oriented northwest to southeast (Fig. 2). Two periods of construction produced Rooms 2, 3, and 4, a somewhat rectangular roomblock measuring 10.05 m. along the north wall, 9.77 m. along the south wall, 4.07 m. along the west wall, and 3.17 m. along the east wall (Fig. 3). The four exterior walls of the roomblock are continuous in their extent, show no interruption in the masonry, and are bonded into each other. This indicates that the original roomblock was built as a single unit. The two interior walls, which divide the roomblock into three rooms of roughly equal size, were built after the four exterior walls. This is evidenced by the fact that the interior walls, with the possible exception of the south end of the east interior wall of Room 2, are abutted against the exterior walls.

Sometime after the completion of the primary roomblock, Room 1 was added onto the pueblo. The north end of the west wall of this small room is abutted against the cornerstones of the southeast corner of the primary roomblock. The method of wall construction is much different for Room 1 than for the other three rooms of the roomblock. Whereas the walls of the primary roomblock average 35 to 45 cm. in thickness and are compound--meaning that they are two building blocks in thickness--the walls of Room 1 are simple--only one building stone in thickness. The west, south, and east walls of this room are composed of small sandstone blocks, with each stone facing both the interior and the exterior. The walls average approximately 25 cm. in thickness.

The roomblock is built upon a layer of artificial fill. Apparently the ground surface at the site at the time of its construction was not level, and therefore dirt, containing cultural material such as potsherds, lithics, and bone, was carried in and deposited. When the surface was brought up to the desired level, often requiring as much as 50 cm. of fill on the downhill

Figure 3. The primary roomblock during excavation, looking northwest.

(southern) side, construction of the walls was begun.

The Anasazi constructed the Dominguez site by building a foundation under what was to be the four exterior walls of the primary roomblock. This was done by first digging shallow trenches in the appropriate places, and then filling the trench with river cobbles and an abundance of white-colored mortar. The resulting foundation is from 2 to 3 courses in height, and is, in places, wider than the walls built atop of it. The river cobbles were probably obtained from the Quaternary deposits that abound in the area.

The roomblock was then constructed atop the foundation, using stone that was obtained from nearby outcrops of the Dakota and Burro Canyon Formation. The sandstone, once quarried, was shaped by crudely roughing out the desired shape by direct percussion flaking and to a lesser extent, by pecking the surface smooth. The latter technique was most frequently used to produce cornerstones. The masonry produced at the site is of relatively good quality. The sandstone blocks are laid in fairly regular, definite courses, with a modest amount of reddish-brown mortar. The use of "chinking" or of thin spalls wedged in the interstices of the exposed wall surface, is minimal. The surfaces of the walls are smooth and the size of the building stones is generally homogenous. The quality of the masonry is comparable to other Pueblo III sites on the Mesa Verde.

Although the walls of the primary roomblock averaged 60 cm. in height upon excavation, no doorways were found. Rooms 2, 3, and 4 were probably accessible only through entry-ways in the roof. The masonry walls of Room 1 average only 25 cm. in height. Too little of the walls of this room remain to ascertain the manner of entry.

No roofing material was found in the fill of the roomblock. The material either completely disintegrated without burning or was removed for the construction of a nearby pueblo.

Room 1

As mentioned above, Room 1 is a small addition to the primary roomblock. The walls are simple in most places, and are built directly on soil rather than on a foundation. The building stones are on the average smaller and more roughly shaped than those of the primary roomblock. Masonry walls define all but the north side of the room; here, a jacal wall stood. Evidence for the jacal wall's existence consists of a distinct change in soil color and texture, and of three postholes in line with the soil change at right angles to the northern extreme of the east wall. Sticks and brush were presumably woven around these posts and were abutted to the masonry walls on either side. Mud and small stones then could have been plastered over the wooden framework, and left to harden in the sun. The postholes were set approximately 55 cm. apart.

The interior of Room 1 measures 1.7 by 2.1 m., and has a floor area of 3.5 sq. m. The room contains the roomblock's only firepit. The firepit has a diameter of 47 cm., and a depth of 14 cm. The feature is abutted against the center of the south wall, and uses a portion of the wall to confine the firepit. The firepit is partially slab lined.

The floor of Room 1 is not plastered, and consists of a hard-packed soil surface. Floor artifacts were sparse, consisting of a few potsherds, a lapstone, and a turkey humerus (Fig. 4).

Evidence of roof construction for Room 1 is nonexistent. The room's small size implies that the roof was not as high as that of the primary roomblock.

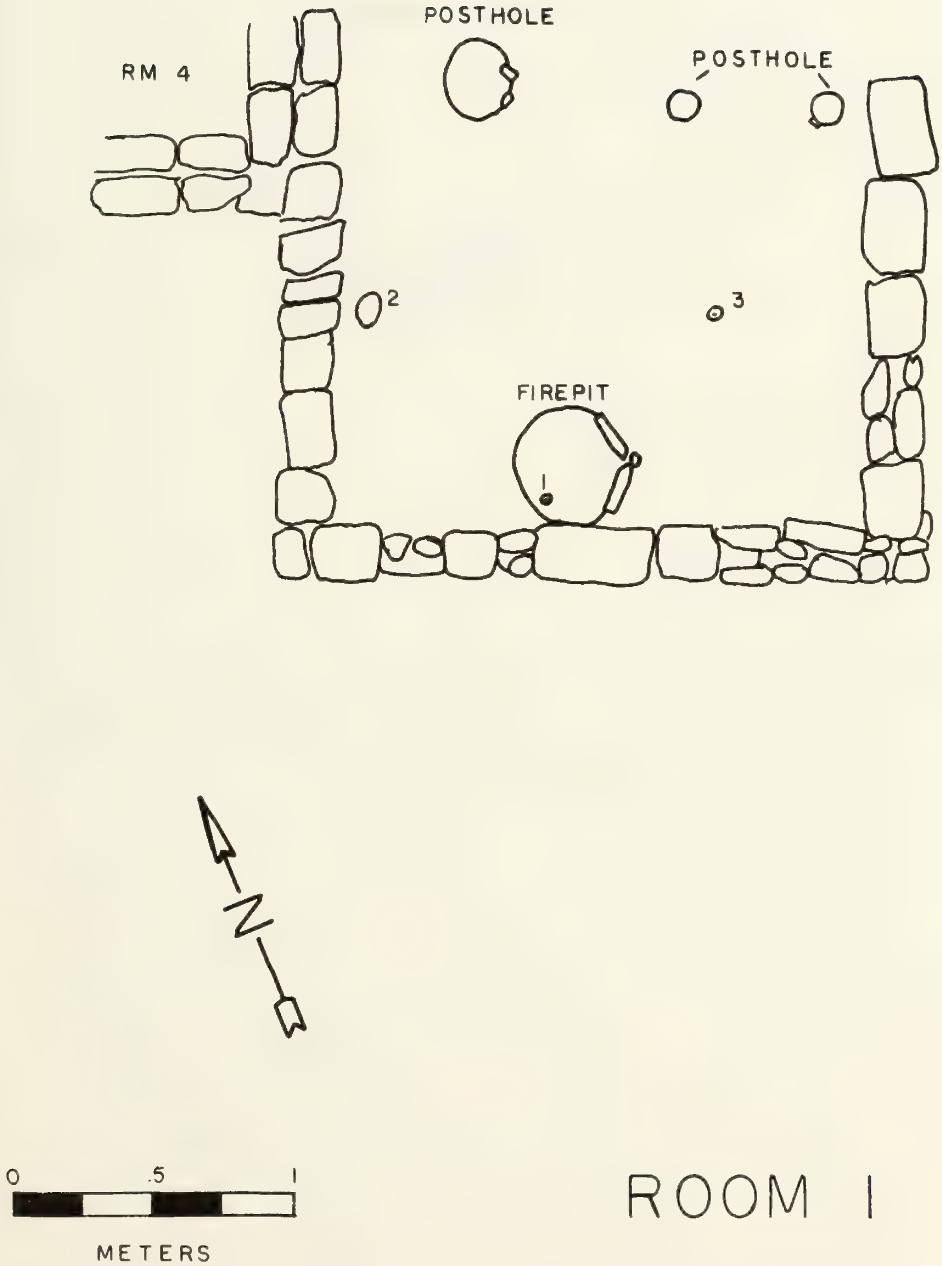
Figure 4. Plan of Room 1.

Room 1, Floor Artifact List. Numbers correspond to locations on Fig. 4.

1. corrugated potsherd

2. lapstone

3. turkey humerus, unmodified.

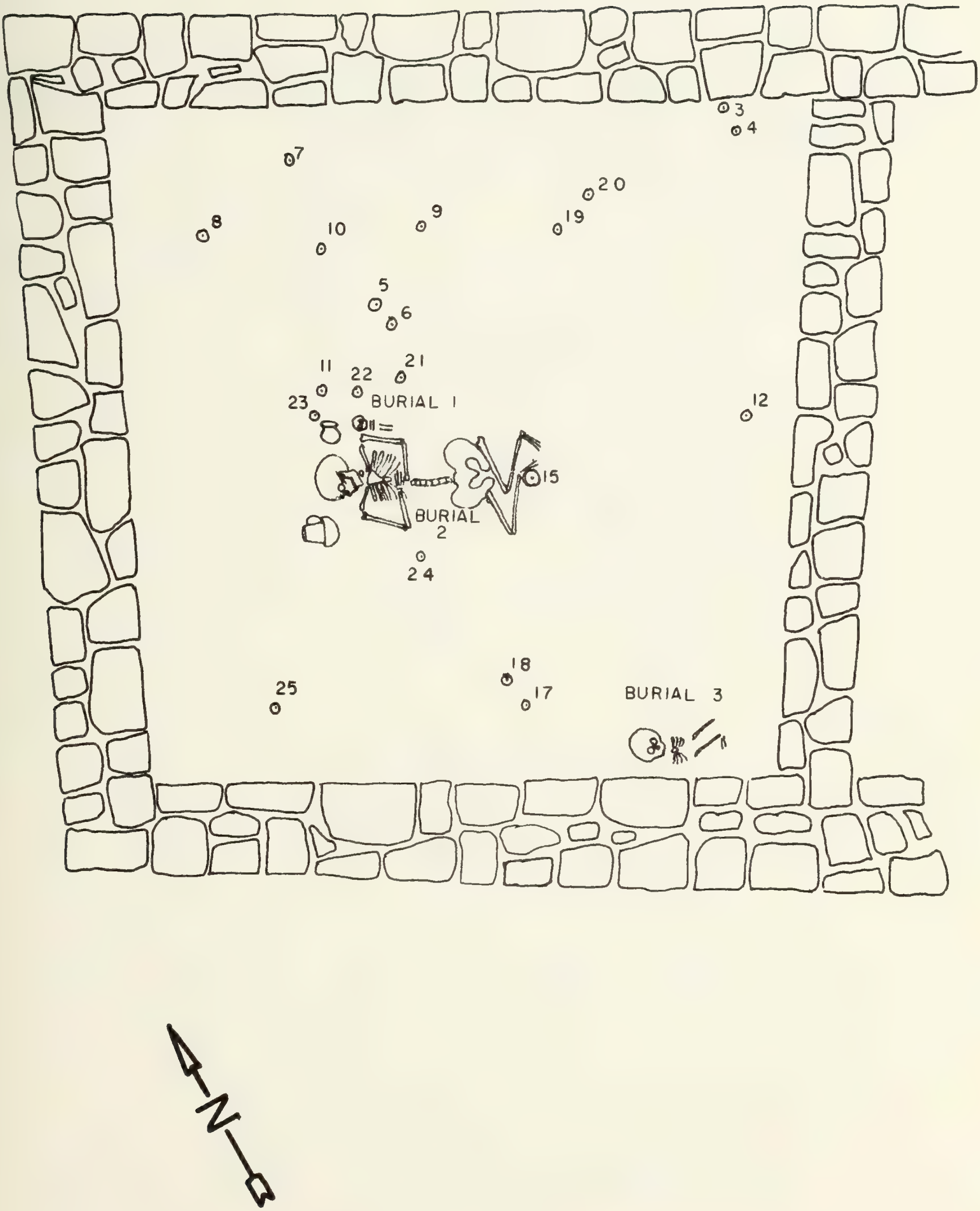


ROOM I

Figure 5. Plan of Room 2.

Room 2, Floor Artifact List. Numbers correspond to locations on Fig. 5.

1. Mancos Black-on-White potsherds, provenience missing
2. corrugated potsherd, provenience missing
3. unclassifiable gray ware potsherds
4. mule deer mandible fragment, unmodified
5. corrugated potsherds
6. mano fragment
7. corrugated potsherd
8. unclassifiable white ware potsherd
9. mano
10. corrugated potsherd
11. corrugated potsherd
12. corrugated potsherd
13. discarded
14. discarded
15. hammerstone
16. human ulna, part of Burial 3
17. mano fragment
18. mano fragment
19. hammerstone
20. mano
21. corrugated potsherds
22. corrugated potsherds
23. corrugated potsherds
24. corrugated potsherds
25. corrugated potsherds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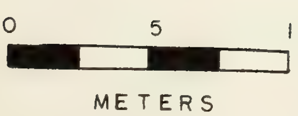
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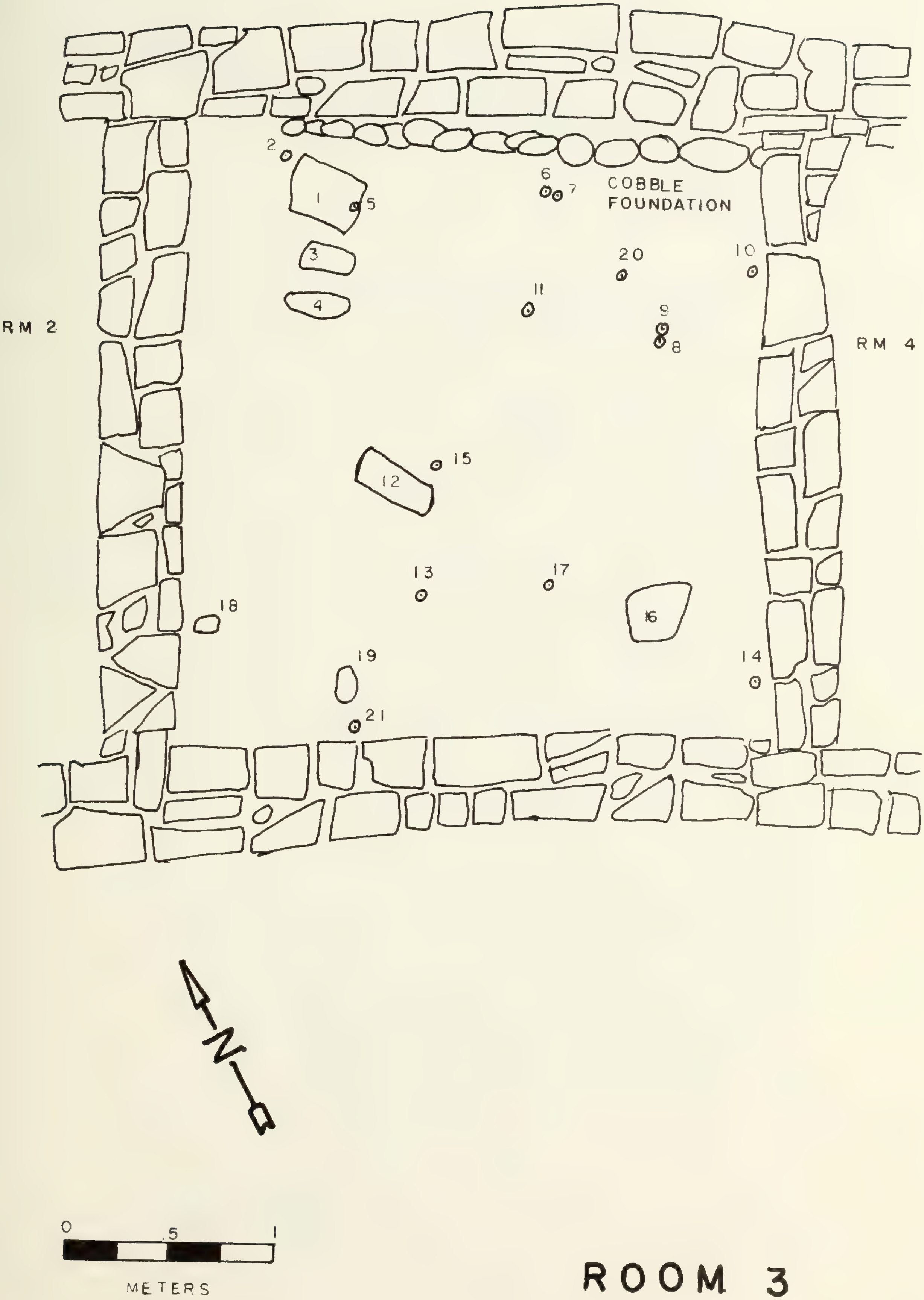
ROOM 2

Figure 6. Plan of Room 3.

Room 3, Floor Artifact List. Numbers correspond to locations on Fig. 6.

1. metate
2. nonutilized flake
3. discarded
4. discarded
5. mule deer humerus, unmodified
6. unclassifiable white ware potsherd
7. Mancos Black-on-White potsherd
8. Mesa Verde Corrugated potsherd
9. corrugated potsherd
10. corrugated potsherd
11. metate
12. metate
13. unclassifiable gray ware potsherd
14. Mancos Black-on White potsherd
15. Mancos Black-on-White potsherd
16. discarded
17. human talus
18. discarded
19. discarded
20. unclassifiable white ware potsherd
21. Mancos Black-on-White potsherd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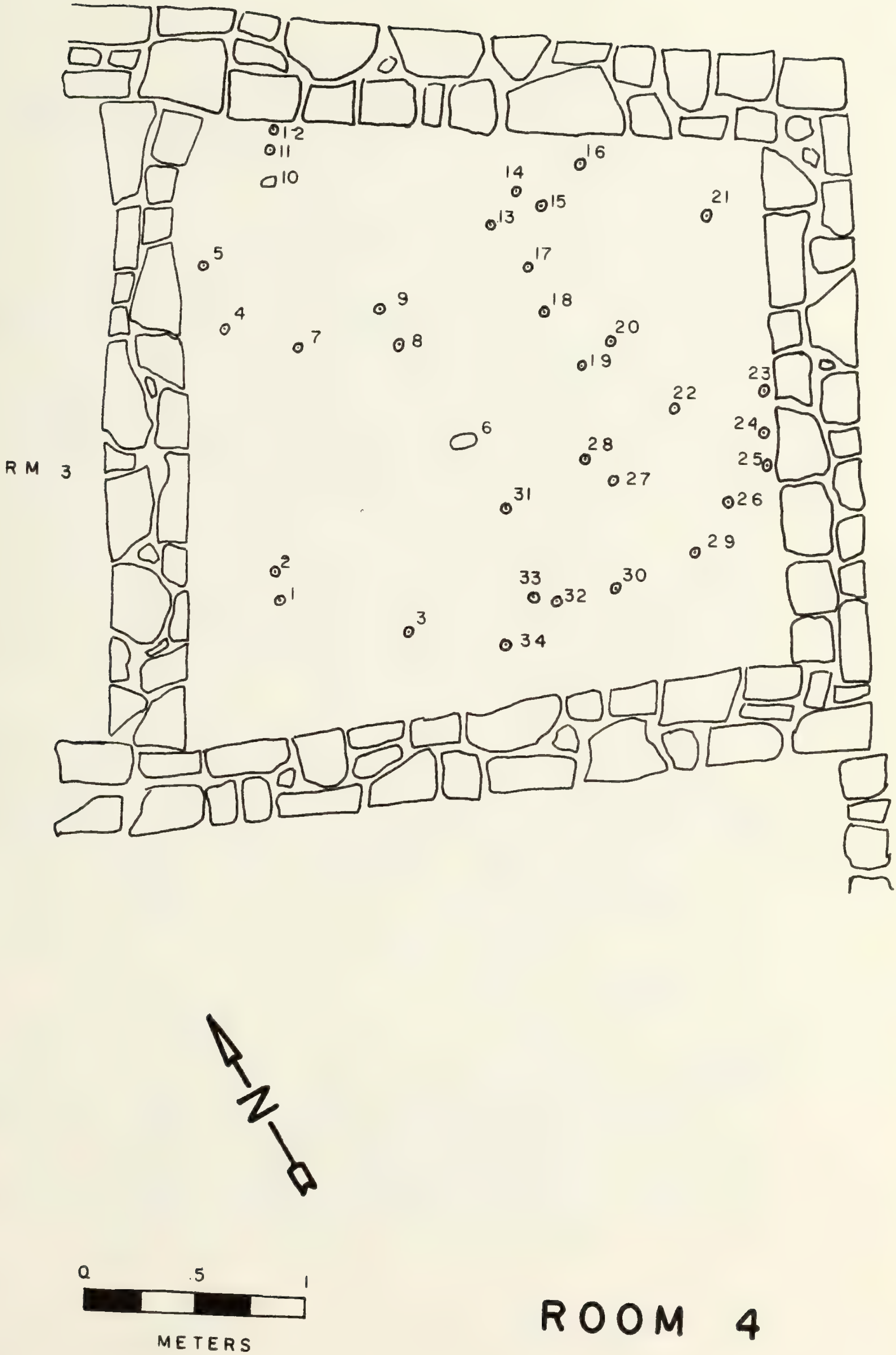
ROOM 3

Figure 7. Plan of Room 4.

Room 4, Floor Artifact List. Numbers correspond to locations on Fig. 7.

1. corrugated potsherds, plus 2 Mancos Black-on-White potsherds
2. unclassifiable white ware potsherds
3. worked cobble
4. Mancos Black-on-White potsherds
5. worked slab
6. mano
7. unclassifiable white ware potsherds
8. corrugated potsherd
9. unidentified bone, unmodified
10. mano fragment
11. corrugated potsherd
12. nonutilized flake
13. Mancos Black-on-White potsherds
14. utilized flake
15. Mancos Black-on-White potsherds
16. Mesa Verde Corrugated potsherd
17. Mancos Black-on-White potsherds
18. corrugated potsherd
19. Mancos Black-on-White potsherd
20. corrugated potsherd
21. Mancos Black-on-White potsherd
22. Mancos Black-on-White potsherd
23. Mancos Black-on-White potsherd
24. Mancos Black-on-White potsherd
25. unidentified white ware potsherd
26. unclassifiable white ware potsherd
27. corrugated potsherd
28. corrugated potsherd
29. potsherd, missing
30. potsherd, missing
31. unclassifiable white ware potsherd
32. unclassifiable gray ware potsherd
33. unclassifiable gray ware potsherd
34. unclassifiable gray ware potsherd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METERS

ROOM 4

Room 2

Room 2 was the largest room of the pueblo, measuring approximately 3.08 m. by 3.14 m., with a floor area of 9.7 sq. m. As in Rooms 3 and 4, the top course or two of the foundation intrudes onto the floor in places. No floor features are present (Fig. 5). The floor was apparently heavily damaged by the interrment of three sub-floor burials after the room's abandonment. The original light-gray plastered floor is visible only in a few places.

Artifacts located on the floor's surface and on the approximate level of the original floor included unmodified animal bone, potsherds, two hammerstones, and fragments of ground stone.

Room 3

Room 3, the central room of the primary roomblock, measures approximately 2.80 m. by 3.0 m. with a floor area of 8.4 sq. m. (Fig. 6). The floor is in good condition, consisting of a light-gray plaster surface.

Set into the floor in the northwest quarter of Room 3 were two slab metates. Both metates were positioned at an angle of approximately 45 degrees, with the lower end set into a shallow depression in the floor. This depression was evidently used to catch vegetal material as it was ground. One unmodified mule deer humerus and a variety of potsherds were found on the floor throughout the room.

Room 4

Room 4 is the eastern-most room of the primary roomblock (Fig. 7). The room measures approximately 2.6 by 2.5 m., with a floor area of 6.5 sq. m. Room 4, as the other rooms in the primary roomblock, has a hard packed floor of light-gray plaster.

Upon the floor were found two mano fragments, some chipped stone, two fragments of unmodified animal bone, and a scattering of potsherds. No floor features were found.

Kiva Architecture

The kiva (Figs. 8 and 9) is located 5 m. south of the roomblock. It is very crude and small compared to typical McElmo Phase kivas; it measures 3.25 m. north to south and 3.50 m. east to west, it has a dirt back wall and banquette instead of coursed masonry, and has four pilasters instead of the typical six. At first glance, the structure seems more typical of an Ackmen Phase kiva than one of the McElmo Phase. Tree ring dates from the kiva, however, indicate that it was constructed in the McElmo Phase. The presence of these simple features may be due to the kiva's small size, and to the compact nature of the alluvial soil.

While the kiva was probably architecturally sound during the occupation of the pueblo, it has stood the test of time poorly. The earthen back wall and banquette have since largely collapsed, leaving only two badly slumped pilasters, the lower portions of the banquette, and the floor and its features intact. The lack of a back wall substantially complicated the excavation of the kiva.

Pilasters

As mentioned above, the kiva was constructed with four pilasters. Only the northwest pilaster remained essentially intact, and it too had slumped forward from its original position on the banquette (Fig. 10). The base of the intact pilaster was .77 m. above the floor; this measurement is probably fairly close to its original height. The pilaster itself was built of shaped sandstone blocks laid in regular courses. It measures .53 m. across

its interior face, and extends .40 m. towards the presumed location of the back wall. The pilaster presently is .40 m. in height. Several courses of the northeast pilaster remained intact, although most of it had fallen. It appears to have been constructed much like the northwest pilaster.

The southeast and the southwest pilasters have completely collapsed. Some of the rubble was found in the area where these pilasters originally stood, and the remainder had fallen within 15 cm. of the floor--indicating that these two pilasters had fallen a relatively short time after the kiva was abandoned. The southern two pilasters may have been recognized as being structurally unstable by the builders, as these two pilasters each had two vertical slabs set beneath them into the face of the banquette, presumably for additional support.

Ventilator shaft

As is typical with Mesa Verde area kivas, the ventilator shaft of the kiva at the Dominguez Ruin is located at the southernmost extreme of the structure. The tunnel is largely intact as it enters the kiva, for at that point it is partially masonry-lined. The masonry wall extends .74 m. along the banquette wall, and stands .81 m. in height--probably the original height of the banquette at this portion. The masonry is two courses in thickness, and merely encloses the ventilator tunnel where it passes through the banquette into the kiva. The remainder of the ventilator tunnel is unlined, and has since collapsed. The tunnel extends from the floor up .55 m., and is .30 m. wide.

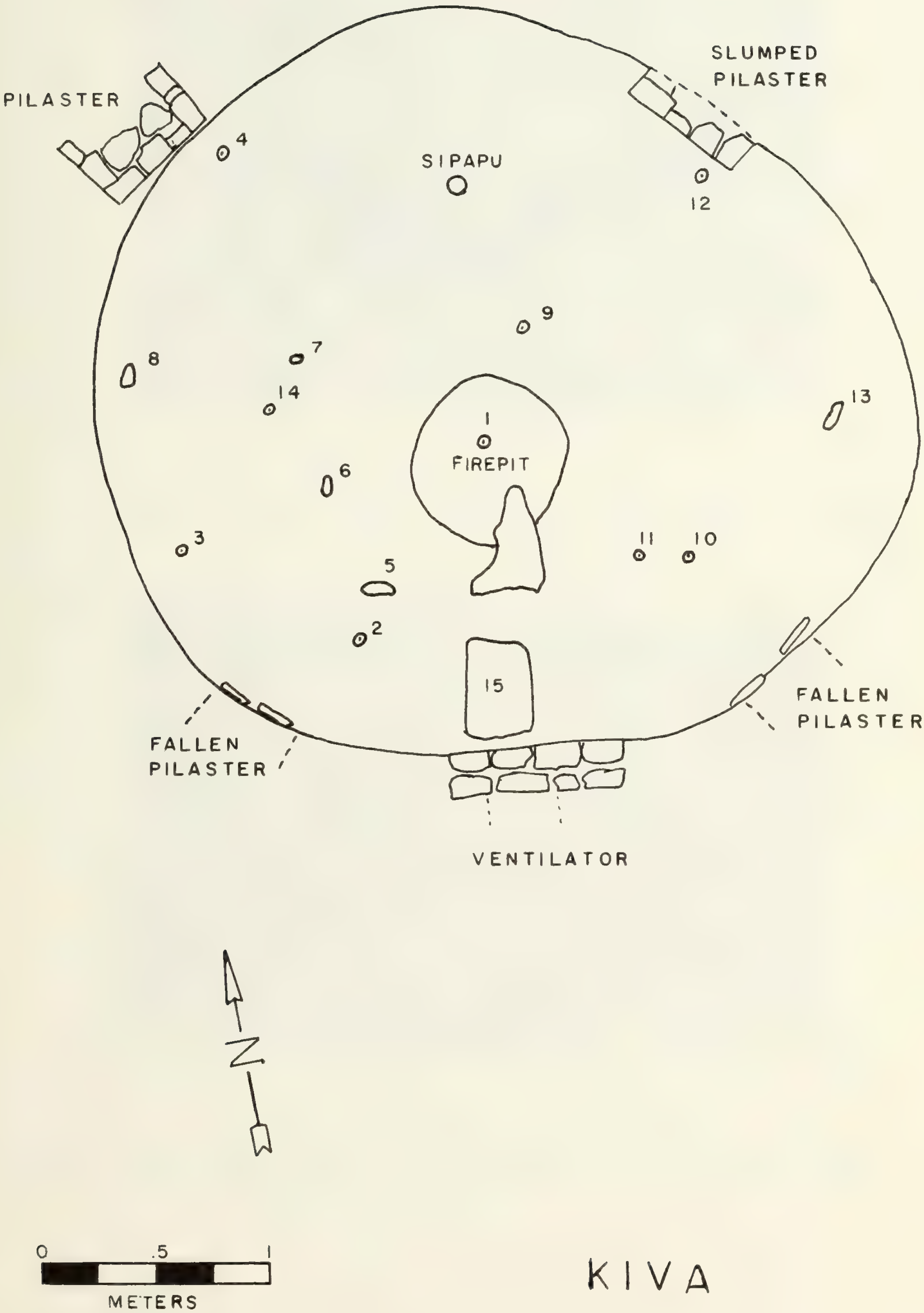
No evidence of a southern recess was found, although it is possible that one did exist.

Figure 8. Kiva upon completion of excavations.

Figure 9. Plan of kiva.

Kiva, Floor Artifact List. Numbers correspond to locations on Fig. 9.

1. unclassifiable gray ware potsherd
2. utilized flake
3. hammerstone/core
4. unidentified bone, unmodified
5. lapstone
6. worked cobble
7. worked cobble
8. mano
9. unclassifiable gray ware potsherd
10. mano
11. mano
12. bobcat femur
13. mano
14. nonutilized flake
15. metate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METERS

KIVA

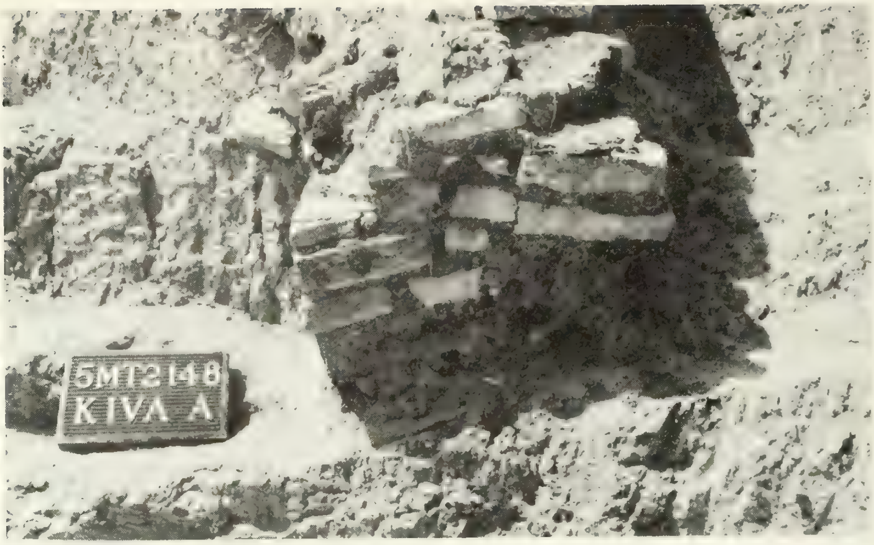

Figure 10. View of the northwest pilaster, slumped forward.

Figure 11. Ventilator tunnel and deflector system.

Floor Features

The typical masonry or jacal deflector was absent in the kiva. In its place was a system whereby a large, tabular sandstone slab was placed over the ventilator tunnel opening (Fig. 11). The slab is subrectangular in shape, and measures 57 cm. high, 34 cm. wide, and 7 cm. thick. When excavated, the sandstone slab essentially plugged the ventilator tunnel, and had a large inverted metate abutted against its base. By abutting one end of the sandstone slab to the metate, and by leaning the other end against the masonry surrounding the ventilator tunnel, the incoming flow of air could have been deflected. The amount of incoming air could have been regulated by moving the metate towards or away from the ventilator tunnel.

A large circular firepit is situated just south of the center of the kiva. The firepit is clay lined, and has a clay collar raised just slightly above the surrounding floor. The sides and the bottom exhibit a red burn. The firepit measures approximately .80 m. in diameter, and is .25 m. deep. It may have been remodeled, in that the sides of the pit, after descending from the collar about 10 cm., level off briefly before descending again to the bottom. The firepit may have either been enlarged at the top or deepened in its center.

The firepit contains fine white ash and charcoal fragments in its lower levels, with increasing amounts of alluvial soils and roof fall in its upper strata.

Roughly in line with the ventilator shaft and the firepit in the northern portion of the kiva is located the sipapu. It measures 0.07 m. across and is covered completely by a ceramic cap. The cap is fashioned from a gray ware potsherd which is ground along the periphery.

Floor Artifacts

Upon the floor of the kiva were found two lithic flakes, a hammerstone/core, four manos, a metate (part of the deflector system), two animal bones, and the remains of a utility jar. The various implications of the presence of these floor artifacts will be discussed later in this chapter.

Roof Construction

The kiva at the Dominguez Ruin, like virtually every other Mesa Verde area kiva, had a cribbed roof, as evidenced by the presence of pilasters and several charred juniper beams which had fallen roughly in line with their original orientation. The beams provided the only dendrochronological specimens on the site. The kiva apparently burned well after it was abandoned, as there is approximately .50 m. of fill between the floor and the burned roof material.

Plaza Excavations

Numerous test squares were excavated in the area south of the roomblock and north of the kiva, with hopes of locating the plaza surface. Oftentimes firepits, mealing bins, and other activity areas are found in the immediate area. Unfortunately, no plaza surface or features were encountered.

Discussion

The architecture of the Dominguez Ruin generally conforms to other McElmo Phase sites in the Mesa Verde area. The quality of the building blocks and the manner of coursing the masonry is comparable to many early Pueblo III sites on the Mesa Verde. The

layout of the pueblo, with the kiva to the south of the roomblock, is typical of many Pueblo II and Pueblo III Period sites in the area.

The kiva is unusual for the McElmo Phase in that it has only four pilasters, an earthen back wall and banquette, and an atypical deflector system, but the variation may be due to the small size of the structure. The remainder of the features of the kiva, such as the large masonry pilasters, the above-floor ventilator shaft, and the possibility of a southern recess conform well to typical Pueblo II and Pueblo III Period Mesa Verde kivas. That the kiva is contemporaneous with the rest of the pueblo is beyond reasonable doubt, as the ceramics found therein are predominantly the same types, and in the same frequencies, as those found in the roomblock.

As mentioned, the kiva produced several dendrochronological specimens. These were sent to the Laboratory of Tree-Ring Research at the University of Arizona for analysis. While most of the specimens were unsuitable for providing cutting dates, one, in the subjective judgment of the Tree-Ring Laboratory, was found to have been cut around 1123 A.D. This date falls within the McElmo Phase, and is probably close to the date of the construction of the primary roomblock.

The primary roomblock is notable in that it is constructed of compound walls and has quite large rooms--averaging approximately 8 sq. m. A sample of six other Mesa Verde sites was undertaken in order to see how the room size of the primary roomblock compared in size to other McElmo Phase sites. Big Juniper House (Swannack 1969), MV499 (Lister 1964), MV875 (Lister 1965), MV1104 (Lister and Breternitz 1968), MV1914 (Hewett 1968), and MV1088 (Lister and Smith 1968) were selected solely on the basis of contemporaneity,

availability of written reports, and by being mesatop pueblos rather than cliff dwellings. Together, these Mesa Verde sites had an average floor area of 5.06 sq. m. All of the Mesa Verde sites in the sample except MV875 were constructed primarily of simple walls. These predominantly simple walled pueblos had rooms that averaged 4.30 sq. m.--close to half the size of the Dominguez Ruin rooms. At MV875, the construction during the second occupation of that site resulted in an apparently preplanned pueblo consisting of compound walls enclosing rooms averaging 8.83 sq. m. This indicates that while pueblos with compound walls are not all that common on the Mesa Verde, they do exist, and they tend to have rooms upwards of twice the size of simple walled pueblos. The architecture of the primary roomblock at the Dominguez Ruin, therefore, is somewhat uncommon in the Mesa Verde area, but does have its parallels.

Essential to the reconstruction of any site is the determination of the functions of architectural features, and of the activities that may have taken place therein. Analysis of floor features, pollen samples, distribution of floor artifacts, and ethnographic literature concerning the western Pueblo Indians are studies employed in this report towards these ends.

Roomblock

The four rooms of the roomblock can be divided into two functional types: habitation rooms and storage rooms. The two types are usually easily distinguishable from each other; storage rooms are generally smaller in size and are relatively featureless in comparison to habitation rooms (Hill 1970). At the Dominguez Ruin, the problem of distinguishing the two is a more complicated task, as the three rooms of the primary roomblock are nearly all the same size, and all rooms except the smallest room (Room 1)

lack firepits. The identification of function for each room will have to be made on the basis of specific data.

Room 1:--Normally, a room substantially smaller than others in a site would be designated a storage facility. The presence of a firepit containing seeds amongst the ash indicates that this small room was used at least at some point in the site's occupation as a cooking area. It is hard to imagine the room being used extensively for food preparation, however, as the room's small size makes it impossible for one to get more than a meter away from the fire. The majority of the cooking done at the site was possibly done in a plaza area, although no archaeological features were found there to support this supposition. The absence of a prepared floor and the paucity of floor artifacts indicates that the room was not utilized extensively.

Room 2:--The wholesale destruction of the floor of Room 2 that occurred upon the interrment of three individuals beneath the floor has made it impossible to determine the room's original function. Items designated as "floor artifacts" may actually be just constituents of disturbed fill. No economic pollen was found in the samples taken at floor level (Scott: Appendix A, this volume). Some lenses of ash were found mixed in with the fill approximately 0 to 10 cm. above the floor level, possibly indicating the presence of a firepit in this room before the floor was disturbed.

Room 3:--The presence of a large number of floor artifacts along with two "mealing bins" strongly suggests that Room 3 was a habitation room, and that activities such as food preparation, eating, sleeping, water storage, and a great many other activities were carried out in this room (Hill 1970). Hill (1970:48) states that at the Broken K Pueblo, whenever two or more metates were

found in bins in the same room, their grinding surfaces would vary in coarseness. This, he states, is indicative of at least two stages being used in the grinding of vegetal material. The two metates of Room 3 conform to this pattern, as one (F.A. 1) is comprised of a coarse pebble conglomerate, and the other (F.A. 12) is comprised of quartzitic sandstone.

Hill (1970:49) also was able to infer that a great deal of butchering was carried out in the habitation rooms at the Broken K Pueblo, as evidenced by the occurrence of 77% of all the unmodified animal bone from the site in the habitation rooms. The pattern was substantially different at the Dominguez Ruin, however, as only 24% of all unmodified bone came from the entire roomblock. The bones discarded in the roomblock at the Dominguez site were probably waste products from cooking and eating. Only one unmodified bone was found upon the floor of Room 3.

A plethora of black-on-white potsherds from the floor constitutes additional evidence that food preparation and eating took place in Room 3. Pollen samples taken from the floor level also point to these activities taking place in this room, as Scott (Appendix A, this volume) reports finding *Zea* pollen from this level. While Hill (1970:51) reports that storage rooms at the Broken K Pueblo contained greater amounts of domestic pollen than either habitation rooms or kivas, the opposite seems to be true at the Dominguez Ruin. The floor of Room 3, an apparent habitation room, had a greater concentration of domestic pollen than the other floors tested.

Room 4:--Room 4 lacks any floor features so its classification as a habitation room is dubious. It does contain a mano and a mano fragment, two unmodified animal bones, and the highest number of potsherds of any living surface. The potsherd counts

include a number of corrugated jar fragments and black-on-white bowl and jar fragments. Pollen samples taken from the floor indicate that .5% was comprised of Zea pollen.

Room 4 may have been multifunctional--serving as a storage facility as well as housing activities such as food preparation and consumption.

Kiva

According to Mindeleff (1891:130) the kivas of the Hopi and Zuni serve as ceremonial structures where religious events are focused and also as a male "clubhouse" where leisure time is spent in activities such as weaving and other crafts. Archaeological remains indicate that prehistoric kivas maintained similar functions. At the Dominguez Ruin, it appears that the kiva was used for ceremonial purposes, flintknapping, weaving, bone tool manufacturing, and roasting and/or eating.

That the Dominguez kiva was used for ceremonial purposes is evinced by the occurrence of rather rare items in the kiva, which have no counterparts in the other parts of the site. The kiva contained a nodule of malachite, which may have been highly valued for its scarcity and its color. Also found in the kiva was a large gray ware vessel atop the firepit, which contained quantities of Sphaeralcea and Zea pollen (Scott, Appendix A, this volume). Scott writes that Sphaeralcea is used for medicinal purposes among the Hopi, and suggests that it may have served a similar function prehistorically. Spaeralcea appears to have been cultivated or manipulated at the Dominguez site, as at Hovenweep (Scott, Appendix A, this volume). It is interesting to note that "exotic" animals are found only in the kiva. Whereas dogs, artiodactyls, and turkey bones occur throughout the site, the bones of

wolf, porcupine, bobcat, beaver, goose, and grouse occur only in the kiva fill and on the kiva floor. These animals are all common to the area (or once were), but evidently were not hunted extensively. They possibly had ceremonial as well as subsistence value. A "tibia tinkler" was found near the floor of the kiva. This artifact, consisting of a cottontail tibia with its proximal articular surface ground off, is frequently in association with kivas (Swannack 1969).

As is the case among the ethnographic accounts of the Pueblo Indians, the kiva at the Dominguez site appears to have been the center for weaving (Mindeleff 1891). Three bone weaving tools, characterized by large transverse grooves along the shaft and a high degree of surface polish, were found at the site--all in the kiva. Clothing, probably of both cloth and leather, apparently was manufactured in the kiva, as nine out of the ten awls found at the site were from the kiva. Gillespie (1976:50) points out that awls and other bone tools show a clear association with pit structures in the Mancos Canyon, and cites Rohn (1971) and Swannack (1969) as stating that this association with kivas is found throughout the Pueblo II and III Phases of the Mesa verde. Gillespie adds that the occurrence of bone tools in prehistoric kivas supports the hypothesis that these structures were used predominantly for male activities, as males of the modern western pueblos manufacture most of their people's clothing (1976:150). Whether the male inhabitants of the Dominguez Ruin manufactured clothing is, however, unknown. The manufacture of the bone tools themselves evidently took place in the kiva, as all occurrences of bone scored or grooved for controlled splitting were in the kiva.

As at the Broken K Pueblo, flintknapping was an important activity in the kiva at the Dominguez Ruin. The only bone tool

classified as a "flaker" was found in the fill of the kiva, and the floor itself was strewn with several lithic flakes and a core.

That the kiva was used for roasting and/or food consumption is evidenced by the presence of several burned artiodactyl and small rodent bones in the firepit. The importance of the kiva as a cooking facility is not well understood at the Dominguez Ruin, but it is speculated that it was of relatively minor importance for the pueblo at large.

The gray ware jar found atop the firepit in the kiva may have been used as a cooking vessel, but the pollen types found within its contents suggests that it served for the preparation of medicinal concoctions.

Social Groups

The Dominguez Ruin may have consisted of one or two households, with a total population of approximately 8 to 11 people. These estimates are based on Mindeleff's (1891:65) observation that modern Pueblo households usually consist of one storage room and one habitation room per household, and Hill's (1970:75) population estimate of 2.8 people per room as based on Hopi data. It should be noted, however, that the validity of using ethnographic accounts of Hopi and Pueblo behavior for extrapolating Anasazi behavior is ultimately questionable. Hill's formula may be generally applicable to the Dominguez Ruin, in that Hopi rooms average approximately 9.0 sq. m., which is only slightly larger than the three rooms of the primary room-block at the Dominguez Ruin (8.0 sq. m.). If all four rooms of the Dominguez Ruin were occupied simultaneously, approximately 11 people inhabited the site. If Hill's (1970:75) observation that 22% of the rooms of a living Pueblo are abandoned at any point in time is applicable to small

prehistoric sites like the Dominguez Ruin, the number of inhabitants occupying the Dominguez Ruin was probably closer to eight.

CHAPTER III
MATERIAL CULTURE

Pottery

Indigenous Mesa Verde Ceramics

Excavations at the Dominguez Ruin yielded a total of 1,092 potsherds and eight whole or restorable pottery vessels. The ceramic artifacts are basically classified following the typological schemes of Abel (1955) and Breternitz, Rohn and Morris (1974). The types for corrugated gray wares have been changed somewhat from those offered by the authors mentioned above, however. The distinction between Mancos Corrugated and Mesa Verde Corrugated (Breternitz *et al*. 1964) is not recognized in this report unless the criteria for these types are manifested in the extreme. A high number of corrugated potsherds, therefore, are simply typed as "Unclassifiable Corrugated".

A summary of the total number of potsherds classified within pottery types and their proveniences are presented in Table 2.

Gray Wares:--Pottery of this type probably constituted the basic utilitarian pottery of the Anasazi. Grayware potsherds represented 60% of the total ceramic artifacts recovered. Of the grayware potsherds, nearly all were jar rather than bowl fragments.

A single Chapin Gray potsherd, and a single Mancos Gray potsherd were found. These pottery types tend to date before A.D. 950 (Breternitz *et al*. 1974). Over a hundred other non-corrugated grayware potsherds were recovered, but lacked the attributes required for specific typing. Five hundred and forty-four corrugated vessel fragments were recovered. Of these, 2 were classified as Mesa Verde Corrugated, and 4 were classified as Mancos Corrugated.

TABLE 2

Provenience of potsherd types

	Chapin Gray	Mancos Gray	Mancos Corrugated	Mesa Verde Corrugated	Unclass. Corrugated	Unclass. Gray	Piedra B/W	Mancos B/W	McElmo B/W	Unclass. White	Tusayon Polychrome	Unclass. Tusayon	White Mtn. Red Ware	Puerco B/R	Chaco B/W	Gallop B/W	TOTAL
ROOM 1 Level 1					16	6		1	1	6							30
Floor Fill					1	2											3
Floor					1												1
ROOM 2 Level 1					12	5		5	1	11			1	1			36
Floor Fill					7	3		3	2	7							22
Floor					23	3		10		1							37
Sub-floor					23	3		6	6	11							49
ROOM 3 Level 1					21	4		5	3	10	2						45
Floor Fill					16	1		3	2	14							36
Floor				1	5	1		4		2							13
Sub-floor					79	4		4		5							92
ROOM 4 Level 1			1		5	1		1	1	2						1	12
Floor Fill					8		1	3	1	12							25
Floor				1	12	3		28		4							48
Sub-floor	1				18	11		9		5							44
KIVA Upper Fill					53	15		13	11	22	1						115
Lower Fill		1	1		53	13		19	3	37							127
Floor Fill					5	9			1	5							20
Floor						1											
EXTRAMURAL			2		181	24		35	24	62	2	5			1		336
TOTAL	1	1	4	2	539	109	1	149	56	216	5	5	1	1	1	1	1092

White Wares:--White ware pottery, i.e., pottery that is painted and/or slipped, accounts for 40% of the total potsherd inventory. Excavations yielded a single Piedra Black-on-white potsherd, which usually dated between A.D. 750 to 900 (Breternitz _et al_. 1974). The predominate white ware is Mancos Black-on-white, accounting for 34% of the white ware potsherds. McElmo BLack-on-white also is common, comprising 12% of the white ware total. Mancos Black-on-white and McElmo Black-on-white tend to date to the Pueblo II and Pueblo III phases respectively (Breternitz _et al_. 1974). The remaining white ware potsherds were unclassifiable.

Trade Wares

A total of 14 trade ware potsherds was found at the Dominguez site. Of these, most originated in the Kayenta rather than the Chaco areas within Anasazi culture. Five potsherds were classified as Tusayan Polychrome, Variety A, and five were unclassifiable Tusayan redwares. One Puerco Black-on-red potsherd, and one White Mountain Redware potsherd, were also recovered. The imported white wares were represented by a Gallup Black-on-white potsherd and a Chaco Black-on-white potsherd.

Whole or Restorable Vessels

Pueblo II-III corrugated jar

A partial large jar was found in the fill immediately above the fire pit in the kiva (Fig. 12). The jar, whose corrugations had been almost completely obliterated, can be attributed to the Pueblo II or Pueblo III Period. The jar has yet to be reconstructed.

Figure 12. large Pueblo II-III jar *in situ* in kiva.

Figure 13. Minature Pueblo II-III corrugated jar; greatest diameter: 8.5 cm.

Miniature Pueblo II-III corrugated jar

Height: 10.8 cm. Neck height: 1.1 cm.
Maximum diameter: 8.5 cm.
Neck diameter: 6.3 cm.
Orifice diameter: 7.7 cm. Thickness: 0.38 cm.
Average width of coils: 0.43 cm.

This complete small jar (Fig. 13) was found in apparent association with Burial 1. The rim is filleted and pinched to a narrow, slightly rounded edge. The rim flares out sharply from the neck. The shoulders are barely discernible. The base is rounded with one flattened circular area, which is slightly off center. The overall shape of the vessel is globular.

Pueblo II-III corrugated jar

Height: 21.0 cm.
Height of corrugations: 17.5 cm.
Maximum diameter: 21.2 cm.
Width of coils: 0.6 cm
Minimum diameter: 12.2 cm.
Width of rim fillet: 0.9 cm.
Orifice: 18.0 cm. Thickness: 0.5 cm.
Height of maximum diameter: 8.0 cm.
Height of minimum diameter: 18.0 cm.

This jar (Fig. 14) has a round bottom and rounded shoulders. The walls curve inward gently to the neck constriction, and then flare outwards. The rim is filleted and rounded. The coils at the basal rim is filleted and rounded. The coils at the basal portion are obliterated. The vessel is globular in shape. The nearly complete jar was found broken and scattered in the subfloor excavation of Room 2, in the fill above Burial 1.

Figure 14. Pueblo II-III corrugated jar; greatest diameter: 21.2 cm.

Figure 15. Pueblo II-III corrugated jar; greatest diameter: 16.5 cm.

Pueblo II-III corrugated jar

Height: 16.0 cm. Maximum diameter: 16.5 cm.
Minimum diameter: 9.6 cm. Orifice: 11.6 cm.
Height of corrugated band: 15.0 cm.
Average width of coils: 0.7 cm.
Width of rim fillet: 1.6 cm.
Height at minimum diameter: 15.0 cm.
Thickness: 0.5 cm.

This necked jar (Fig. 15) has a rounded bottom and rounded shoulders. The walls curve inward from the point of maximum diameter to constrict the neck, and then flare outward. The rim is filleted. The overall shape of the vessel is globular. A single strap handle 2 cm. wide is present. This fragmentary vessel was found broken in the fill beneath the floor level of Room 2, immediately above Burial 1.

Mancos Black-on-white bowl

Height: 10.1 cm. Diameter: 18.2 cm.
Thickness: 0.5 cm.

This artifact (Fig. 16) is a deep, open bowl with a round bottom and steep rounded sides. The rim is uneven and rounded. The surface is polished but not slipped. On the exterior, the coils have been only partially obliterated. The interior of the pot is decorated with a mineral paint, consisting of an unframed band layout of hatched double scrolls. The top of the entire rim is painted. The vessel was found in the subfloor fill of Room 2, immediately above Burial 1.

Figure 16. Mancos Black-on-white bowl; diameter: 18.2 cm.

Figure 17. McElmo Black-on-white canteen; greatest diameter: 18.9 cm.

McElmo Black-on-white canteen

Height: 19.0 cm. Maximum diameter: 18.9 cm.
Neck height: 2.7 cm. Neck diameter: 3.8 cm.
Base to shoulder: 9.5 cm. Thickness: 0.4 cm.
Orifice diameter: 3.1 cm.
Handle height, width: 1.7 x 3.8 cm.

This necked jar (Fig. 17) is canteen-shaped with a globular body and a small constricted orifice. It has two small handles, set high on the wall above the shoulders, which occur at mid-point. The neck tapers inward towards the orifice. The base is indented. The surface of the jar is slipped and polished, but badly weathered. The carbon paint is apparently completely burned out and is discernable only where a fire cloud has preserved it in negative. The design is a series of nested chevrons with medium-thick lines. The design begins 2 cm. below the shoulder, and continues up to the neck region. The vessel was found in the fill of Room 1.

McElmo Black-on-white pitcher

Height: 21.1 cm. Neck diameter: 10.5 cm.
Neck height: 12.7 cm.
Orifice diameter: 10.1 cm.
Maximum diameter: 5.7 cm.
Thickness: 0.5 cm.
Handle: 13.2 x 3.2 x 0.8 cm.

This vessel (Fig. 18) is pitcher-shaped. It has a strap handle extending from just below the rim to the shoulder. The walls are slightly curved up to the shoulder, and then form sharp shoulders as they constrict to form the neck. The neck is cylindrical and slightly constricts at the center. The rim is even and rounded, and the base is indented. The surface of the vessel is slipped and polished. The design is of carbon paint, and is divided into

Figure 18. McElmo Black-on-white pitcher; greatest diameter: 5.7 cm.

Figure 19. McElmo Black-on-white bowl; diameter: 30.2 cm.

three areas. At the shoulder are three lines which encircle the pitcher. Two are solid lines and one is dotted. The neck is covered with a panel band of various designs. The top of the handle is painted with negative diamonds. This vessel was found in association with Burial 2.

McElmo Black-on-white bowl

Height: 12.6 cm. Diameter: 30.2 cm.
Thickness: 0.5 cm.

This shallow, open bowl (Fig. 19) has relatively straight, flaring sides and an uneven, squared rim. Both the interior and exterior surfaces are unslipped. The exterior has been wiped and sketchily polished, and the interior has been well polished. The vessel is tempered with crushed sherd, rock, and calcite, the latter of which has expanded creating pits in the vessel's surface. The interior has been decorated with carbon paint, in the form of bilateral, converging circular scrolls. The scrolls are hatched. The bowl is slightly warped. This vessel was found in association with Burial 2.

Ornaments

Morris (1939) has pointed out the relative dearth of ornaments found in Anasazi sites north of the San Juan River. Few if any sites in this region have produced ornaments which can compare quantitatively or qualitatively to specimens excavated from some of the great town sites such as Pueblo Bonito in the Chaco Canyon (see Judd 1954). The Dominguez Ruin, however, stands out as an exception.

Within the confines of this small site were excavated literally

thousands of beads, and also several pendants of such quality as to rank among some of the finest examples of Anasazi craftmanship. Nearly all of the ornaments were found in association with Burials 1 and 2, two individuals interred in close proximity to each other beneath the floor of room 2. The remainder of the site produced only 2 bone beads, approximately one half of a large jet pendant, and a small keystone-shaped shale pendant. Excluding the ornaments found in association with the burials, the inventory of ornaments within the Dominguez site appears to conform well with other Mesa Verde sites.

Beads

Close to 6,900 beads were excavated from the pueblo; all but four were found in association with Burial 2. Two beads were found in the mid section area of Burial 1, a small infant. One of these beads (Fig. 20) measures 0.6 cm. by 0.5 cm., and is manufactured from an Oliva undatella shell, a species probably collected along the Pacific coast. The bead was produced by grinding off the spiral end of the shell down to a point where a hollow tube resulted. Small amounts of red pigment, possibly hematite, were observed on the bead upon excavation. Whether the bead was at one time entirely covered with this pigment, or whether the pigment was deposited upon the shell after the interrment of the pigment-covered infant is uncertain. A few faint striations oriented parallel to the logitudinal axis of the bead are present, but no polish is discernible.

Within a few centimeters of the Oliva bead was found a bilobed or "figure-8" shaped bead (Fig. 21). This bead measures 0.9 cm. in length, 0.5 cm. in width, and 0.3 cm. in thickness. When viewed from the side it is thicker at the base, that is, the lobe distal to the perforated lobe, than it is from the top. Judd

Figure 20. Oliva bead associated with Burial 1.
Scale in millimeters.

Figure 21. Bi-lobed shell bead associated with Burial 1.
Scale in millimeters.

(1954) observes that this attribute compensates for the "end spreading" that would result from stringing a large number of these relatively long beads together and then wearing such a string about the neck. Judd (1954:92) suggests that the bilobed style of bead is unique to the Pueblo III Period. The bilobed bead from the Dominguez site is biconally drilled, and is ground to a slight polish. The bead is made of shell, the species of which is not descernible.

The approxiamtely 6,900 disk-shaped beads (Fig. 22) found in association with Burial 2 were by far the most common, outnumbering the turquoise beads by a 6 to 1 ratio. This ratio, coupled with the discovery of groups of these beads in their original pattern in the hard soil surrounding the skeleton, suggest that many of these beads were strung in a pattern consisting of a series of 6 to 10 jet and shale beads, followed by a series of 4 turquoise beads. The turquoise beads are more variable in size than the jet and shale beads, ranging from 2.0 mm. to 4.0 mm. in diameter, and 1.0 mm. to 2.0 mm. in thickness. There is little variation in the color and quality of the turquoise; however, all are deep blue to bluish-green in color, and contain no matrix whatsoever. It seems probable that the turquoise comprising these many beads come from the same source. The jet and shale beads are much more consistent in size than the turquoise beads, averaging 2.5 mm. in diameter and 1.5 mm. in thickness. Color ranges from the lustrous, coal black jet beads to the dull gray of the shale beads. With the exception of some of the largest of the turquoise beads, which are biconally drilled, the perforations of the disk beads are straight and not flared. The holes average only 1.0 mm. in diameter. Haury (1931) has shown that it is possible to drill such miniscule holes with a cactus spine--few other objects suitable for drilling seem appropriately delicate or ubiquitous.

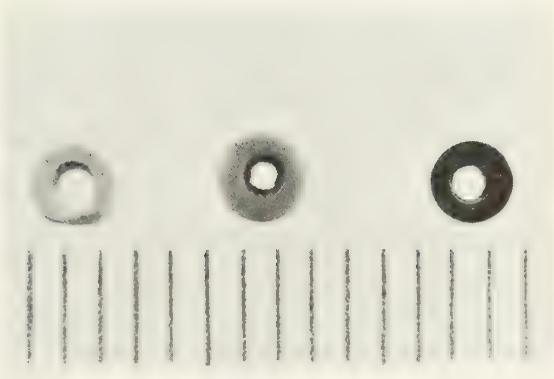

Figure 22. Disk beads. From left to right: beads made of shale, turquoise, and jet. Scale is in millimeters.

Hayes and Lancaster (1975:161) suggest that the straightness of the sides of the perforations is the product of friction produced by the string upon the inner portions of the hole upon wearing and handling the strung beads, and not from the method of manufacture.

Two bone beads were recovered during the course of excavations. One was found just outside the south wall of the roomblock, and the other was within 10 cm. of the floor of the kiva. The former bead is manufactured from the first phalanx of an unidentified artiodactyl, and measure 3.7 cm. in length and 1.3 cm. in width. The proximal and distal articular surfaces have been ground radically, producing a hollow tube with rounded ends. The entire surface is extensively polished. The second bone bead, produced from an ulna of an unidentified ave (turkey?) is 3.5 cm. long and 0.8 cm. wide. The bone has been transversely truncated along the bone's shaft, by means of scoring the bone with a stone tool and then snapping it off, producing a hollow tube with squared ends. The bead retains a high polish.

Pendants

A large pendant comprised of shell and turquoise and in the shape of a frog was excavated from the vicinity of the sternum of Burial 2. Frog effigy pendants are not unknown in the Anasazi material culture, some having been excavated in both the Chaco and the Mesa Verde areas. The frog effigy pendant from the Dominguez site, however, stands as one of the largest and perhaps most complexly constructed ornaments of its type in the Anasazi cultural area. The pendant (Fig. 23) measures 7.6 cm. in length, 4.5 cm. in width, and 0.7 cm. in thickness, and consists of three layers of shell, one atop the other, held together by a lac adhesive. The shells were apparently glued together before the final shaping of the ornament took place, as the periphery of the

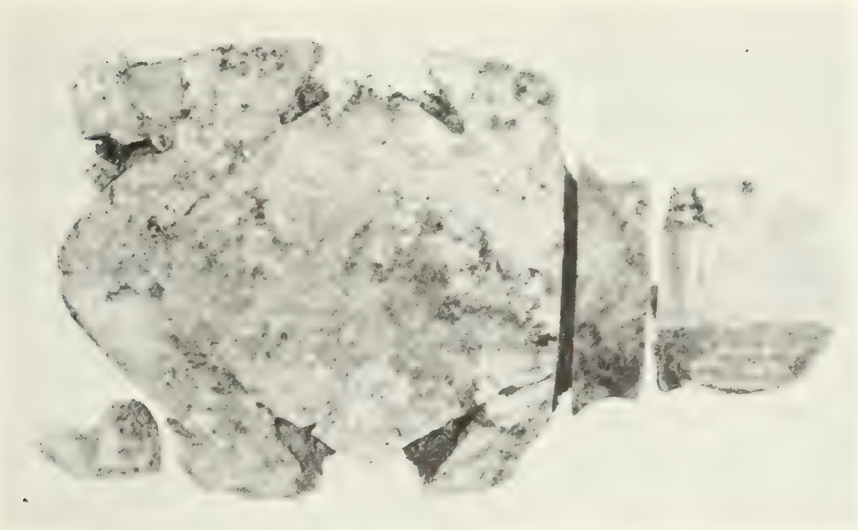

Figure 23. Dorsal view of frog-effigy pendant. Length: 7.6 cm.

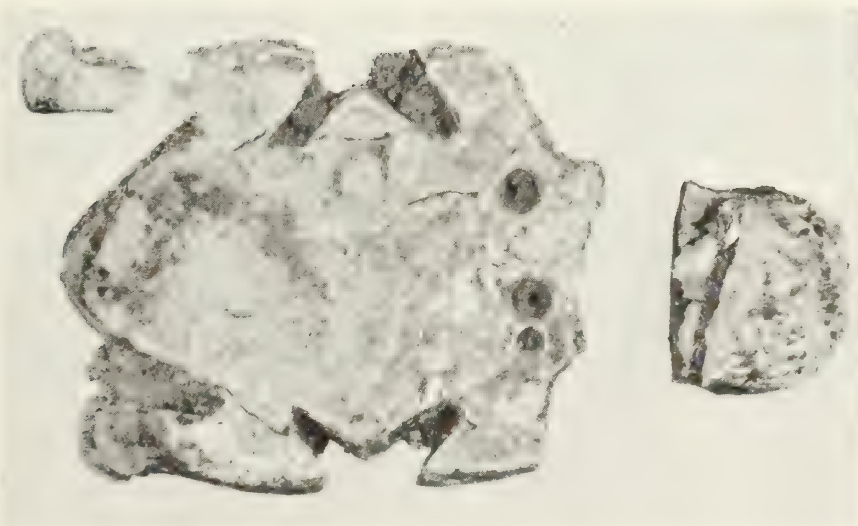

Figure 24. Ventral view of frog-effigy pendant.

ornament is beveled from top to bottom via grinding. The resulting edge is smooth. The pendant is biconvex in cross section both longitudinally and transversely. The ventral surface of the pendant is comprised of abalone shell (either Haliotus fulgens or H. crocherodii) according to Malcolm Withers (personal communication), and retains its mother-of-pearl luster. Three holes, which perforate only the ventral and perhaps medial shell layers, are located just posterior to the neck of the frog effigy on the on the ventral surface. These holes (Fig. 24) have been biconally drilled. The smallest hole measures 3.5 mm. in diameter; two larger holes measure 5.0 mm. in diameter and are somewhat symmetrical in their location. The holes probably functioned to suspend the pendant, but the manner in which this was accomplished is not known.

The medial layer of shell has not been identified specifically, as only a small area is visible. It may consist of abalone.

The dorsal side of the frog effigy pendant was certainly the side for display. The dorsal layer of shell, identitied as Laevicardium elatum, has been cut away in certain places down to the medial layer, leaving a space in which to inlay turquoise bands. Three such bands are present. The neck band is slightly biconvex in cross section, and measures 2.7 cm. in length, 0.8 cm. in width, and 0.03 cm. in thickness. Maximum thickness is found at the center of the band. The turquoise band, similar to all of the turquoise from the pendant, is sky blue in color and contains no matrix. In addition, to the neck band, two small squares of turquoise (0.6 x 0.6 cm.) are inlaid in the hind legs of the pendant. In addition, two semi-spherical "eyes" were found in close proximity to the pendant upon excavation. The "eyes" have a diameter of 0.07 cm., and stand in profile 0.04 cm. The base has

been ground flat and on it traces of lac can be observed. Although the dorsal portion of the head has exfoliated somewhat as a result of weathering, and so is fragmentary, it seems safe to assume that the semi-spherical "eyes" were glued atop the head and were not inlaid.

One small hole, with a diameter of 0.03 cm. is located in the center of the dorsal surface of the pendant, immediately below the turquoise neck band. It is filled to the level of the surrounding surface with adhesive--its function is unknown.

A red pigment is observable on portions of the dorsal surface. This may have been intentional decoration, or more likely, is the result of the deceased individual being covered with a pigment upon interrment.

It is debatable whether or not two virtually identical circular ornaments (Fig. 25) are indeed pendants, as no means for suspension can be ascertained. The ornaments were found just distal to the face area of Burial 2, in a manner suggesting their suspension about the neck; however, it is possible that they were merely placed atop the individual upon burial. The two "pendants" are surprisingly similar in size; one measure 4.2 cm. in diameter and contains inlaid in its center a turquoise disk 1.9 cm. in diameter, and the other measures 4.1 cm. in diameter with a turquoise disk measuring 1.95 cm. in diameter. The similarity strongly suggests that the two were manufactured at nearly the same time, and probably by the same craftsman.

The two ornaments were constructed in the following manner: First, an outer ring of shell (probably Haliotus sp.) was ground circular and plano-convex in cross section. Weathering has rendered the exact identification of the species of the shell used for this portion impossible. The shell disk then had a circle cut

out of its center, into which an abalone plug with a thickness of approximately half that of the outer shell ring was inserted. A lac adhesive held this plug in position, in addition to a large, well ground and polished turquoise disk which was placed atop the plug. The turquoise disks in both ornaments are blue in color, and possess no matrix. The exceptional quality of the turquoise suggests that it originated in the Los Cerillos area of New Mexico; however, no physical tests have been performed to confirm the source.

Surrounding the turquoise disk is a concentric ring of specular hematite. This material, while beautifully polished and dark black and metallic in appearance, is very brittle and has been broken badly through time. The band is only 0.3 cm. in width, and 0.15 cm. in thickness. The specular hematite was not inlaid into the shell; rather, it was merely set into the lac adhesive surrounding the turquoise disk.

Within the ash of the firepit in Room 1 was found a large jet (or possible gilsonite) pendant. The pendant (Fig. 26) is roughly rectangular in shape, but has one end broken off which is apparently burned. In cross section, the pendant is biplanar; it measures 5.7 cm. in length, 4.5 cm. in width, and 1.0 cm. in thickness. The entire surface of the pendant retains a high polish, but also possesses many striations that are oriented both parallel and perpendicular to the longitudinal axis of the ornament. The cause of these striations are unknown. In the center of the pendant near the very top is a biconally shaped hole that completely penetrates the pendant. This hole probably functioned to suspend the ornament. To each side of this central hole, on both the front and back of the pendant, are two holes. These holes do not penetrate the pendant nor are they aligned with the hole on the

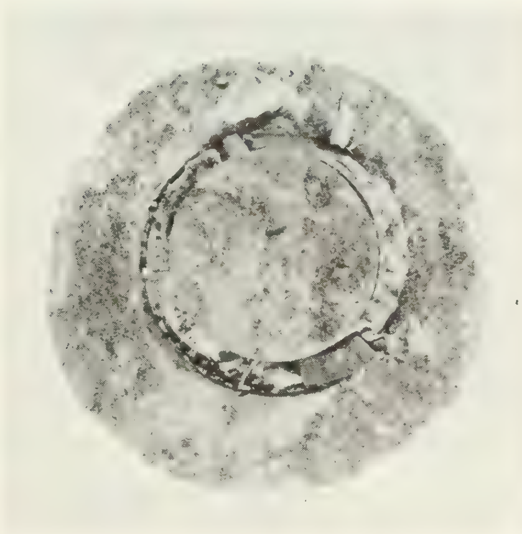

Figure 25. One of two nearly indentical shell, specular hematite and turquoise pedants. Maximum diameter is 4.2 cm.

opposite face. The holes on one side are cone-shaped and quite shallow; they may have been inlaid with some other material. The holes on the other side may also have been for inlay, but are much different in design. Both of these holes have been drilled from two directions--from the front and from the top. A notch out of the top edge of the pendant results. Several percussion flakes have been removed, possible unintentionally, from one side of the pendant. The relatively battered appearance of this pendant may have resulted in its being discarded to the fire hearth. It seems, however, that a piece of jet of such size would have been kept for reworking.

A small rectangular shale pendant was recovered during the excavation in the kiva fill. This ornament (Fig. 27) appears to closely resemble many others found in the Mesa Verde area (e.g., Rohn 1971; Swannack 1969). Measuring 1.9 cm. in length and 1.2 cm. in width, the pendant has been ground to shape. Both sides of the pendant are very flat and possess polish as well as minute randomly oriented striations. A small hole for the ornament's suspension is located in the center towards the top of one end.

Mosaics

While mosaic ornaments are more common in archaeological sites in the Mesa Verde area than are the two preceeding ornament types, seldom are they in abundance. Morris (1919:102) describes one burial at the Aztec Ruin that contained twenty mosaic-incrusted shell disks, but such finds are uncommon, even in Chacoan outliers such as Aztec. Burial 2 at the Dominguez Ruin was interred with three mosaic ornaments. Two were located immediately beneath a McElmo Black-on-white bowl placed near the head of the individual, and another was found near the skeleton's right elbow. The three ornaments appeared to be identical in size, design, and materials.

Figure 26. Fragment of a large jet pendant.

Figure 27. Shale pendant.

Each ornament consisted of small rectangular tesserae, individually measuring between 0.5 cm. and 0.07 cm. in length, 0.02 cm. to 0.03 cm. in width, and approximately 0.01 cm. in thickness. The tesserae, consisting of equal numbers of an unidentified shell and turquoise, were arranged in a manner producing alternating bands of turquoise and whitish shell. The tesserae were evidently glued to a perishable material, probably a wood or basketry, that has since vanished altogether. As a result, it was virtually impossible to remove the mosaics from the ground while still preserving the original pattern during excavation. The individual tesserae are biconvex in cross section, indicating that the original ornaments were curved. The mosaics originally were probably nearly 4 cm. wide, and 7 cm. long.

Chipped Stone Artifacts

Projectile Points

Only two projectile points were recovered during the excavation of the Dominguez Ruin. Both are small triangular-shaped arrow points (Fig. 28), very similar in appearance to what Hayes and Lancaster (1975: 144-5) have called "Style B" points. This style of Anasazi point has a relatively straight sided blade, corner notches, and an expanding base. Hayes and Lancaster (1975:144-5) see "Style B" arrow points as being intermediary between the deeply corner notched points with straight stems that are found in Basketmaker III and Pueblo I contexts, and the short-stemmed side notched arrow points found in Pueblo II and Pueblo III Period associations.

One of the two projectile points from the Dominguez site is complete. It is concave-convex in cross section, shows regular flaking, and possesses no signs of wear. The other projectile

TABLE 3

PROJECTILE POINTS

Provenience	Length	Width	Thickness	Material	Remarks
Room 1 Floor fill	2.4	1.3	0.3	quartzite	complete
Room 4 Level 1	1.6	1.3	0.3	quartzite	fragment

TABLE 4

BLADE FRAGMENT

Provenience	Length	Width	Thickness	Material	Remarks
Plaza area		2.7	0.5	quartzite	medial fragment

Figure 28. Projectile points.

point is broken along both its transverse and longitudinal axis.

Blade Fragment

Besides the two projectile points mentioned above, only one other stone artifact modified from a flake by purposeful chipping of the surface of the tool was found. The reason for this relative dearth of intentionally flaked stone artifacts at the Dominguez site is unknown. The single blade fragment represents the medial portion to a triangular or leaf-shaped knife. One working edge is straight, shows a moderate amount of attrition, and has an edge of 37 degrees. The other working edge is slightly convex in shape, has an edge angle of 28 degrees, and shows light wear.

Hammerstones

Hammerstones are approximately fist-sized nodules of stone, usually water worn cobbles, that show signs of intentional battering along their peripheries. Most show no evidence of purposeful manufacture, but through use have had flakes removed from their surfaces in a random order. Incidental flake removal does not decrease the efficiency of the tool, and it indeed rejuvinates the working facets, until the cobble has become too small to be of practical use. Several ethnographic accounts of the use of hammerstones by the modern Pueblo Indians are discussed by Woodbury (1954:92-93); they include use as a pecking implement in the manufacture of stone tools and for pecking the grinding surface of manos and metates; use in crushing seed and vegetable fibers, and for dressing building stones.

Of the 16 hammerstones found at the Dominguez site, all show the usual battering along the flake ridges and the naturally narrow portions of the cobble. Twelve hammerstones possess wing fracturing, indicative of striking hard surfaces, and 6 show the

TABLE 5

HAMMERSTONES

Provenience	Length	Width	Thickness	Material	Remarks
Room 2					
floor					
F.A. 15	5.2	4.8	4.5	quartzite	
F.A. 19	6.7	6.1	3.9	quartzite	
Room 3					
level 1	11.2	6.8	4.9	quartzite	
sub-floor	6.7	6.4	5.0	quartzite	
Room 4					
sub-floor	7.6	7.1	5.7	quartzite	
Kiva					
upper fill	5.8	4.1	2.3	quartzite	
lower fill	6.0	5.0	4.0	quartzite	
floor, F.A. 3	11.5	9.1	4.5	quartzite	used as a core
Extramural	6.3	4.7	2.3	quartzite	
	8.3	8.2	4.7	quartzite	
	7.9	5.9	5.9	quartzite	
	8.0	5.8	2.9	quartzite	
	7.7	5.8	4.8	quartzite	
	5.8	5.5	3.1	quartzite	
	7.0	5.5	4.4 un	unidentified	
Surface	8.8	7.0	5.7	quartzite	

random striations over the surface of the tool that would be expected from use and abuse over an extended time. One hammerstone has flakes removed from it in a fashion suggesting that it also served as a core.

Core Scrapers

Core scrapers are herein defined as roughly modified core tools which have wear patterns indicating their use as scraping implements. Most were manufactured from river cobbles, show little flake reduction, and possess slight to moderate wear in the form of unifacial attrition, edge polish, and edge rounding. The shape of the working edge tends to be irregular. Four tools from the Dominguez site fall into this category.

Utilized Flakes

Random percussion flakes that show signs of wear along one or more otherwise unmodified margins are classified as utilized flakes. Except for the indications of wear, these flakes are indistinguishable from debitage.

There are 42 artifacts in this type. Seven percent are obsidian, 26 percent are chert, and 67 percent are quartzite. No primary flakes are represented in the utilized flake population. Secondary flakes comprise 71 percent of the total, and interior flakes comprise the remaining 29 percent.

Several utilized flakes possess more than one utilized edge. Of the 42 utilized flakes there are 56 utilized edges. Thirty-three of these show unifacial wear, and 23 possess bifacial wear. The average edge angle for the unifacial edges is 42 degrees, and the average angle on the bifacial or bifacial wear is any indication of the flakes function, then in the Dominguez sample, edge

TABLE 6

CORE SCRAPERS

Provenience	Length	Width	Thickness	Material	Remarks
Kiva floor fill	6.5	5.9	4.1	quartzite	
Extramural	9.8	7.0	2.9	quartzite	
	5.7	5.6	4.7	quartzite	
	6.5	4.5	2.9	quartzite	

TABLE 7

UTILIZED FLAKES

Provenience / Material	Quartzite	Chert	Obsidian	Total
Room 2, sub-floor	2		1	3
Room 3, sub-floor	1			1
Room 4, floor		1		1
sub-floor	1	1		2
Kiva, upper fill	10	5		15
lower fill	3	2	1	6
floor fill	3			3
floor		1		1
Extramural	7	1	1	9
Surface	1			1
TOTAL	28	11	3	42

angle apparently plays no role in the flakes' selection for the various functions.

In addition to the utilized flakes, two rejuvination flakes were recovered. These flakes are the waste products resulting from the remodification of a utilized tool, and so bear the wear patterns of the original tool. As flakes they were not utilized. One flake shows evidence of battering, and the other shows signs of attrition.

Debitage

This category includes unmodified and unutilized flakes that are simply the waste material produced by flintknapping. The majority were found in the fill of the kiva. Sixty-five percent of the flakes were secondary, and showed some cortex on at least one facet. Thirty-four percent were interior flakes. No primary flakes, i.e., flakes with a substantial amount of cortex on one or more sides of the artifact, were observed. The debitage consists almost exclusively of quartzite material. Ninety-six percent of all unutilized flakes consist of quartzite, and the remaining 4 percent are chert.

Ground Stone

Manos, with convex grinding surfaces

Manos whose grinding surfaces are convex in longitudinal cross section were designed for use in trough metates (Woodbury 1954:67). Of the 30 manos excavated, six are classified within this type. Five of the six manos are unifacial, and one is bifacial, possessing a slightly utilized flat grinding surface on the face opposite the convex grinding surface. All are rectangular to subrectangular in shape. When viewed transversely in

TABLE 8

DEBITAGE

Provenience	Primary Flakes	Secondary Flakes	Interior Flakes	Total
Room 1,				
floor fill		1		1
Room 2,				
sub-floor		2	2	4
Room 3,				
level 1		1		1
floor		1		1
Room 4,				
level 1		2		2
floor		1		1
sub-floor		1		1
Kiva,				
upper fill		7		7
lower fill		8	3	11
floor fill		4	9	13
floor			1	1
Extramural		6	3	9

cross section, 4 are airfoil in design and 2 are plano-convex. All manos in this type are manufactured from sandstone. The length of these manos ranges from 13.7 cm. to 11.2 cm., and averages 12.0 cm. Thickness varies from 5.5 cm. to 2.2 cm. and averages 3.3 cm. None possess finger grooves.

Manos, with flat grinding surfaces

Twenty-three manos possessing at least one flat grinding surface were excavated. According to Woodbury (1954:68), manos of this type were suitable for use on slab metates. Slab metates, Woodbury (1954:59) writes, began to rapidly replace trough metates during the first part of the Pueblo III Period. The relatively large number of manos suitable for use on slab metates found at the Dominguez site, is indicative of the slab metates' popularity by the early 1100's A.D.

The manos of this type tend to be subrectangular in shape; only four oval shaped manos were observed. The materials used in the manufacture of the flat surface manos is diverse. Seventeen are sandstone, 3 are a relatively coarse conglomerate, 2 are made of a felsitic porphyry, and one is limestone. The transverse cross section of the tools are also diverse; 4 are airfoil in shape, 9 are planoconvex, and 10 are biplanar. A single mano possesses finger grooves, which are short grooves pecked into the edge to facilitate handling. Six of the 23 manos of this type are bifacial. Of these, 4 possess flat grinding surfaces, and two are slightly concave in outline.

The length of the complete manos in this type ranges from 28.2 cm. to 15.2 cm., and averages 21.0 cm. Width ranges from 13.3 cm. to 9.8 cm., and averages 12.0 cm. Thickness varies from 6.3 cm. to 1.9 cm., with a mean of 3.8 cm.

TABLE 9

PROVENIENCE OF MANOS

Provenience	Mano Types	Convex Surface Manos	Flat Surface Manos	One Hand Manos
Room 1, level 1			1	
Room 2, floor fill			1	
floor		1	3	1
sub-floor		1		
Room 3, level 1			2	
sub-floor			1	
Room 4, floor fill		1		
floor		1	1	
Kiva, upper fill			2	
lower fill		1	3	
floor		1	3	
Extramural			6	

Manos, One Hand variety

A single small mano comprises this category. The tool has been pecked around its periphery to give it an oval shape. The mano possesses a single grinding surface which is flat in cross section. The tool's distinctive shape separates it from the mano types discussed above. Hayes and Lancaster (1875:154) report on a number of such manos, and point out their resemblance to manos found associated with basin metates in certain Desert Culture and Basketmaker II sites. Basin metates do not appear in the later periods, however, so the exact function of this tool type is questionable.

The artifact is 9.0 cm. long, 7.9 cm. wide, 2.7 cm. thick, and is made of felsite. It was found upon the floor of Room 2 (F.A. 9).

Metates

Metates are defined as stone slabs on which food has been ground by means of a smaller upper stone. The grinding motion is reciprocal (back and forth) and not rotary or in varying direction (Woodbury 1954:50).

Four metates were excavated at the Dominguez Ruin. All are slab metates, meaning that an entire surface has been worn flat or slightly concave as a result of grinding activity. The four metates have been generally shaped by unifacial spalling and pecking. Two are rectangular in form, and two are ovate. The grinding surfaces of all of the metates show wear striations, and two metates retain signs of pecking on their grinding surfaces. According to Woodbury (1954:93), the pecking of a grinding surface increases the surface's efficiency in milling seed materials.

TABLE 10

METATES

Provenience	Length	Width	Thickness	Material	Remarks
Room 2, level 1	18.5	16.2	7.5	sandstone	fragment
Room 3, floor					
F.A. 1	36.0	25.7	13.3	conglomerate	
F.A. 12	42.6	25.5	15.0	quartzite	
Kiva, floor fill	42.5	25.1	13.0	conglomerate	

Lapstones

Artifacts of this type are flattish, oval river cobbles that show various types of wear on one or more surfaces. Working surfaces are highly polished, and possess numerous striations. Whether these striations are the result of using the lapstone with an abrasive action or a cutting action is unknown. Lapstones are thought to be general, portable working surfaces. (Judd 1959:21).

Of the five lapstones excavated, all have utilized surfaces on both sides of the artifact. In addition to possessing polish and striations, two lapstones show signs of pecking on one surface, and two others are somewhat discolored on both working surfaces.

Polishing Stones

A single polishing stone was recovered at the Dominquez site. The tool is unmodified except through use, and consists of a subrectangular, rather flat river cobble. A single utilized surface is present; this surface retains a very high degree of polish and shows a dense concentration of striations, most of which are oriented parallel to the width of the tool. Woodbury (1954:97) suggests that artifacts of this type were used for polishing pottery during manufacture, grinding pigments, and for smoothing and polishing cooking slabs.

Worked Cobbles

Twelve cobbles showing varying degrees of manufacture and use are lumped into this category. Eleven of the twelve possess surfaces that have been ground, and of these, four have been pecked on the grinding surface. One tool possess evidence of pecking only. Three of the tools have been chipped to shape. Two

TABLE 11

LAPSTONES

Provenience	Length	Width	Thickness	Material	Remarks
Room 1, floor F.A. 2	28.8	20.2	4.3	felsite	discolorations
Room 2,					
floor fill	21.8	20.5	4.0	quartzite	fragment
sub-floor	22.0	12.6	4.5	quartzite	pecked
Kiva					
lower fill	21.2	15.3	4.8	felsite	fragment
floor F.A. 5	27.3	15.4	5.1	quartzite	pecked

TABLE 12

POLISHING STONE

Provenience	Length	Width	Thickness	Material	Remarks
Extramural	10.5	6.2	3.1	felsite	

cobbles show evidence of battering as well as grinding, indicating that they may have functioned partly as hammerstones. Tools classified as worked cobbles may have had a myriad of functions.

Worked Slabs

Seven artifacts are classified in this category, and consist of tabular sandstone, quartzite, or felsite slabs that show wear patterns and/or evidence of manufacture. All have been ground on at least one face. Two of the worked slabs are uniformly thin, slightly ground bifacially, and have been spalled around the periphery to produce a circular artifact if complete. These two slabs may have functioned as jar covers.

One small slab shows bifacial grinding, with one edge adjacent to the grinding surfaces ground smooth. While no discoloration was observed on this artifact, it may have served as a palette.

The function of the remaining artifacts in this type is undetermined.

Crusher

A single fragment of a crusher was excavated. This tool is sub-rectangular in shape, and generally looks like a mano. Its massive size, however, clearly renders it unsuitable for mano-like use. The entire periphery has been pecked to shape. Some evidence of grinding is apparent on the convex face of the crusher, but by no means approximates the degree of grinding found on manos. Swannack (1969:122) beleives that crushers may have been used to pulverize hard materials to produce temper for ceramic manufacture. A crusher excavated from a preceramic Basketmaker II site north of Durango, Colorado, however, throws considerable doubt on Swannack's hypothesis (Reed and Kainer 1977).

TABLE 13

WORKED COBBLES

Provenience	Length	Width	Thickness	Material	Remarks
Room 1					
level 1	11.4	7.9	6.3	sandstone	triangular in shape
	10.9	9.2	3.4	sandstone	
Room 4					
floor					
F.A. 3	18.3	14.8	4.2	felsite	
Kiva					
upper fill	8.2	7.8	2.8	felsite	
lower fill	6.8	4.4	2.3	quartzite	battering
	11.7	8.1	5.9	quartzite	
floor					
F.A. 7	10.6	10.4	5.2	sandstone	
Extramural	11.9	9.1	2.9	sandstone	battering
	10.3	9.7	2.9	sandstone	
	20.8	12.7	7.7	sandstone	
	15.0	12.1	4.5	felsite	
	18.7	9.6	4.7	sandstone	battering

TABLE 14

WORKED SLABS

Provenience	Length	Width	Thickness	Material	Remarks
Room 2					
floor fill	25.2	12.4	2.3	sandstone	
	29.7	10.4	0.9	sandstone	jar cover (?)
Room 4					
floor					
F.A. 5	8.9	4.8	2.8	sandstone	jar cover (?)
Kiva					
lower fill	9.5	6.3	0.7	sandstone	jar cover (?)
	5.6	4.1	0.8	sandstone	palette (?)
floor					
F.A. 6	15.1	8.0	7.4	felsite	
sub-floor	12.1	7.9	1.9	quartzite	

Axes

Two complete three-quarter grooved axes were found. Both were manufactured from river cobbles, but have been greatly modified by both pecking and grinding. The grooves for hafting are pecked just distally from the center of the tool. The poll ends show evidence of battering on both artifacts. The bit ends are carefully ground and show slight to moderate amounts of wear. One axe retains striations on the bit that are oriented primarily perpendicular to the axis of the blade; however, some oblique striations are also present.

Miscellaneous Stone Artifacts

Mineral Pigments

Four specimens of paint pigments were recovered at the site. Three consist of hematite, and one of malachite. The three hematite samples vary substantially in texture and hardness, but are all reddish to rusty in color. Two of the hematite pebbles show at least one grinding surface where the pigment was rubbed against a palette or an object being colored.

Pigments were found in the upper, lower, and floor fill of the kiva, and beneath the floor of Room 2.

Petroglyphs

Two building stones with petroglyphs on their finished faces were found at the Dominguez site. Both were sandstone, and had been generally shaped by spalling. The faces of these petroglyph building stones, which presumably would have been exposed beyond the limits of a plastered wall, were pecked smooth, and then had designs pecked and ground into them. One petroglyph (Fig. 29)

TABLE 15

CRUSHER

Provenience	Length	Width	Thickness	Material	Remarks
Room 3 sub-floor	17.0	15.2	7.3	felsite	fragment

TABLE 16

AXES

Provenience	Length	Width	Thickness	Material	Remarks
Kiva					
lower fill	11.8	5.4	3.4	quartzite	
floor fill	11.1	6.4	3.8	granite	

consists of a series of concentric rings, with diameters of 2.7 cm., 5.6 cm. and 9.0 cm. It measures 19.6 cm. in length, 13.3 cm. in width, and 12.7 cm. in thickness. The other (Fig. 30) has a spiral design, with the outer portions of the spirals truncated by the limits of the stone.

Relatively few artifacts of this type are found within the Mesa Verde area. Room 2 at Badger House (Hayes and Lancaster 1975:166) contained a building stone with an incised swastika, and 8 were excavated from the Escalante Ruin. Artifacts of this type seem to be found predominately in the vicinity of the north walls of a pueblo. The petroglyph from Badger House was found in the fill of a room oriented on the north side of the pueblo (Hayes and Lancaster 1975:166), and Nemetz (personal communication) reports that the petroglyphs from the Escalante Ruin were also found in the area of the north wall. One petroglyph from the Dominguez site (Fig. 29) was found in the wall rubble just 1 meter north of the pueblo's north wall. The provenience of the other petroglyph is unknown.

Modified Bone

A total of 29 worked bone implements was recovered. Two specimens are classified as bone beads, and are discussed in the ornament section of this chapter.

Artiodactyl bone was the most common material utilized, accounting for 72% of the total. Of the artiodactyl bone tools, mule deer account for 11 of the artifacts, antelope and elk each account for one artifact, and 8 are from unidentified artiodactyls. Bone tools made from turkey elements are also fairly common, comprising 17% of the modified bone. Single artifacts of dog,

Figure 29. Petrolyph building stone. Width is 13.3 cm.

Figure 30. Spiral petroglyph on face of building stone. Width of stone is approximately 30 cm.

cottontail, and jackrabbit were also found; these comprise the remaining percentages of the total.

Awls

Ethnographic accounts concerning the function of awls suggest that they were used primarily in basket weaving and for the perforation of hides in clothing manufacture (DiPeso 1956:412; Kluckhohn 1971:304). The basic motion of an awl, then, whether being used in sewing or basketry manufacture, is one of piercing. Semenov (1973:18) writes:

> In practice, piercing is not done by straight pressure but is accompanied by turns of the hand to right and left in a quarter or half circle. In this case the points' wear is influenced by two movements; a straight and a rotary one; traces on the point will reflect these two forms of movement. Lines parallel to the axis of the tool will be cut by lines going around it, that is, at right angles to its axis if we think of it in a section.

Those tools classified here as awls are pointed tools which exhibit the type of wear patterns described above by Semenov.

Within the awl category, a couple of sub-types can be recognized. Three of the 13 tools classified as awls can be further classified as weaving tools. These tools are distinctive from the remainder of the awl population in that they possess a very high degree of polish near the tip, and also possess large grooves, oriented transversely to the axis of the tool, located a few centimeters back from the tip. This wear is evidently the result of friction by the tool against the tightly stretched warp strands during the beating down of the weft in loom weaving (Kidder 1932:226).

Another sub-type of awl consists of a single turkey tibiotarsus that has been shaped in a manner so as to closely resemble

what Reed (1975) calls Type 3 of Bird Bone Awls. These tools possess wear patterns typical of awls, are usually made from large avian tibiotarsi, and have their shafts ground down to a tip at approximately a 20^{o} angle. The high degree of morphological and functional uniformity of these tools suggest that they form a discrete type in the Mesa Verde area.

Flaker

A single flaker was found at the Dominguez site. The tool is rather massive, measuring 13.8 cm. in length and 1.3 cm. in thickness. It was manufactured from a metapodial shaft splinter of an elk. The tip end is pitted and rough, presumable due to the nature of the tool's function: pressure flaking of stone artifacts. The butt end of the tool is somewhat battered, suggesting that the flaker may have also served as a punch. The tool was recovered in the lower kiva fill.

Humerus Scrapers

Six bone implements of this type were recovered, and all were associated with Burial 2. Four of the tools were made from the humeri of mule deer, one of an antelope, and one of an unidentified artiodactyl. These tools range in size from 15.3 to 19.1 cm. in length, and average 17.1 cm. The articular head (distal) of the tools were ground to varying degrees, with the apparent intention of removing sharp protuberances.

The wear patterns ovserved on these tools generally supports their classification as scrapers. While wear striations on the exterior of the diaphysis near the transverse scraping blade are oriented both parellel and perpendicular to the working edge, the striations on the interior of the diaphysis tend to be oriented at right angles to the working edge.

TABLE 17

AWLS

Provenience	Length	Species	Element	Remarks
Room 4				
Floor fill	13.4	unidentified artio.	R. tibia	
Kiva				
lower fill	9.7	mule deer	L. tibia	
	8.2	unidentified artio.	metapodial	tip missing
	6.2	dog	first phalange	weaving tool
	16.8	mule deer	L. metatarsal	weaving tool
	16.3	unidentified artio.	metapodial	
	7.2	unidentified	unidentified	butt end used as spatula or scraper
	17.1	mule deer	L. metatarsal	weaving tool
	----	turkey	R. tibiotarsus	fragment
	6.8	turkey	radius	delicate
floor fill	8.7	turkey	L. tibiotarsus	drill hole near butt
	13.8	unidentified artio.	metatarsal	
	9.4	jackrabbit	L. tibia	

Spatula

A single spatula is classified within this type. It consists of an unidentifiable species of artiodactyl, and is fragmented. The working edge is rounded in form, and retains striations on one surface that are generally oriented at right angles to the working edge. The tool's function is uncertain. This artifact was found in the lower kiva fill.

Tibia Tinkler

A possible tibia tinkler was excavated from the floor fill of the kiva. The tool consists of the proximal half of a right tibia of a cottontail, and measures 8.4 cm. in length. As with nearly all artifacts of this type identified in the Mesa Verde area, the proximal articular surface has been removed in a manner as to expose the hollow interior of the bone. The entire surface of the tool shows a moderate degree of polish. The characteristic perforation usually found along the shaft of the artifact is missing, however, probably having been located below the break.

The function of tibia tinklers is unknown. Swannack (1969:155) points out that such artifacts are usually found associated with kivas, and so may have had some ceremonial purpose. The provenience of the tinkler found at the Dominguez Ruin supports Swannack's hypothesis.

Tube

A single bone tube fashioned from the right ulna of a turkey was found in the floor fill of Room 3. The artifact shows a slight degree of polish across its surface, and measures 4.9 cm. in length. The truncated ends of the tool are unmodified. The artifact is classified as a tube rather than as a bead because of its rather unfinished appearance in contrast to the high degree of

polish found on beads, and because of its similarity to a class of artifacts described by Reed (1975) from the Mancos Canyon area of southwestern Colorado. The tubes from this area (called Type 2 tubes) are all made of turkey elements and are highly uniform in size and shape. Tubes similar to those found in the Mancos Canyon area and at the Dominguez site are described by Hodge (1920:125), who believes that they were strung side by side to form a wrist-guard. Several skeletons excavated at Hawikuh were found to have such tubes on their wrists (Hodge 1920:125).

Tool Blanks

One metacarpal and 3 metatarsals of mule deer show evidence of being prepared for controlled splitting. The splitting probably represents a step in the manufacture of bone tools. All artifacts within this type have been grooved along the anterior and posterior mid-lines of the metapodials, presumably with a stone implement. No wear is present. All blanks were from the floor fill of the kiva.

Textiles

While no actual textile remains endured the centuries of weathering at the Dominguez Ruin, the impressions of two such artifacts were encountered. Both were associated with Burial 2. One impression represents a burial mat, laid atop the deceased. This specimen was originally constructed by plaiting 2 strips of vegetal material over 2 underlying strips. The vegetal strips were probably about 0.5 cm. in width, and consisted of reed (*Phragmites* sp.).

A small, vague impression of cotton cloth or some other tightly woven textile was excavated near two identical shell and turquoise pendants found with Burial 2. Its poor condition renders further analysis impossible.

CHAPTER IV
SUBSISTENCE

The physical remains excavated from the Dominguez Ruin indicate a mixed economy, based on agriculture, hunting, and gathering of wild plants. While the relative importance of each of these subsystems to the overall subsistence pattern is very difficult to ascertain from the archaeological record, it appears that the means of subsistence at the Dominguez Ruin was similar to that of the Mesa Verde area in general.

Floral Exploitation

Corn, beans, and squash were the most important domesticated plants in the Southwest, and were probably all grown by dry land farming methods on the large tract of arable land to the south of the Dominquez Ruin. The excavations produced evidence only of corn (*Zea mays*), however, and this in rather small quantities. One charred kernel was found in the firepit of Room 1, and several pollen samples contained *Zea* pollen grains.

In addition to the cultigens listed above, certain "wild" plants were probably part of the prehistoric inhabitant's diet. Lambsquarter (*Chenopodium* sp.), pigweed (*Amaranthos* sp.), mallow (*Malvastrun* and *Sphaeralcea*), purselane (*Portulaca*) and blazing star (*Mentzelia albicaulis*) seeds were recovered at the site. All have ethnographic use in the Hopi and Zuni societies as foods or as medicines (Stevenson 1915; Whiting 1939).

Plants commonly found growing in the area today with ethnographic use as food plants but which are absent in an archaeological context at the Dominguez Ruin are yucca (*Yucca baccatta*), pinon (*Pinus edulis*), beeweed (*Cleome serrulata*), and Indian rice grass (*Oryzopsis hymenoides*).

Faunal Exploitation

Two hundred and fifty unmodified animal bones were recovered in the course of excavation, representing at least 16 separate species. Artiodactyl bones were the most numerous, accounting for 62% of the total number of bones. This figure does not adequately describe the importance of artiodactyls to the subsistence system at the Dominguez site, however, as the relationship between the number of bones of a certain species and its importance in the diet is not a strong one. Many individuals of a small sized species may not be as important to the overall diet of a people as a single animal of a very large species. To alleviate this problem, the minimum number of individuals has been calculated for each species represented at the Dominguez Ruin, based on the total number of the most common element within the bone population of a single species. Pounds of usable meat for each species, obtained by multiplying the average weight of a butchered carcass (White 1953:397) by the minimum number of individuals, perhaps best reflects the relative importance of each species to the Anasazi diet (Table 18).

Calculations of the usable pounds of meat per species represented at the site places artiodactyls as the most important meat source. Various species of artiodactyls combine to comprise 93% of the meat utilized at the site. Of this, mule deer accounts for 49%, antelope, elk and bighorn sheep combine to account for 40%, and unidentified artiodactyls account for 4% of the total. Birds, including turkey, goose, and grouse, comprise 2% of the total pounds of usuable meat at the site. Dogs (and possible coyote), wolf, jackrabbit, cottontail, porcupine, beaver, bobcat, mice and rats make up the remaining percentages, but clearly are of relatively minor importance. It should be noted that the sample is skewed slightly in favor of the larger animals, as excavation

TABLE 18

MINIMUM NUMBER OF INDIVIDUALS
AND USABLE POUNDS OF MEAT

Species	Minimum Number of Individuals	Pounds of Usable Meat
Jack rabbit (*Lepus californicus*)	1	3.0
Cottontail (*Sylvilagus* sp.)	2	3.5
Porcupine (*Erethizon dorsatum*)	1	10.0
Beaver (*Castor canadensis*)	1	38.5
Mouse (*Peromyscus* sp.)	1	nominal
Rat (*Neotoma* sp.)	2	1.0
Grouse (family: Tetraonidae)	1	2.0
Turkey (*Meleagris galopavo*)	5	42.5
Goose (*Branta* sp.)	1	4.0
Dog (*Canis familiaris*)	1	7.0
Wolf (*Canis lupus*)	1	30.0
Bobcat (*Lynx rufus*)	1	15.0
Unidentified *Canis* sp. (coyote ?)	1	12.5
Elk (*Cervus canadensis*)	1	350.0
Mountain Sheep (*Ovis canadensis*)	1	100.0
Mule Deer (*Odocoileus hemionus*)	7	700.0
Antelope (*Antilocapra americana*)	2	110.0
Unidentified Artiodactyl	7	700.0
TOTAL		2129.0

techniques employed at the site undoubtedly resulted in the loss of some of the small rodent, fish, and reptile remains.

The inhabitants of the Dominguez Ruin may have done much of their hunting a few miles to the northeast along the House Creek and Beaver Creek, in what is now the San Juan National Forest. In this area, Anasazi lithics have been found in abundance; but very little in the way of pottery and no pueblos have been found (Zier 1977). The area is above 7,000 feet in elevation, making agriculture risky. Ponderosa pine, dense scrub, and numerous drainages provide an optimum environment for deer (Zier 1977).

CHAPTER V
HUMAN BURIALS

Three human burials and three isolated human bones were uncovered during the excavations at the Dominguez Ruin. The three burials are interred beneath the floor level of Room 2, and were placed there after the abandonment of the room.

Burial 1

Located approximately in the center of Room 2, 0.35 m. below the floor level, was an infant burial (Fig. 31). The infant was positioned on its back in a semi-flexed position, with its head toward the west and facing north. The infant was in surprisingly good condition, with virtually all bones present. Its age at the time of death was between 1 and 4 months, based on the observation that no milk teeth had erupted, the length of the long bones, and that virtually none of the long bones, and that virtually none of the epiphyses had sealed. Determination of sex was not possible.

The infant burial was positioned 0.11 m. above Burial 2, an adult. The infant was evidently covered with a red pigment, probably hematite, upon burial, as this substance is found adhering to the surfaces of many of the bones.

The proximity of Burial 2, a high status burial, to the infant's grave makes it difficult to determine which grave goods are associated with which burial. Of certain association with Burial 1 are two shell beads, found in the vicinity of the infant's midsection. One bead (Fig. 20) consists of an Olivella shell with a spire end ground off to form a hollow tube. This bead, according to Ms. Malcolm Withers (personal communication), is manufactured from an Oliva undatella shell. The other bead

Figure 31. Burial 1, infant.

(Fig. 21), of undetermined species, is bilobed or "figure-8" in form.

Of probable association with the infant burial is a miniature corrugated jar (Fig. 13). This jar is approximately 15 cm. from the head of the infant, almost resting atop the skull of Burial 2. The base of this jar is roughly on the same level as the infant skeleton, which would be at the presumed bottom of the burial pit dug for the infant.

Two medium sized corrugated jars (Figs. 14 and 15) and a small Mancos Black-on-White bowl (Fig. 16) were found in the fill above Burial 1. Whether these vessels are associated with the infant burial or were placed as offerings to the high status burial after the interrment of both burials is moot.

Burial 2

Burial 2 is located in the center of Room 2, 0.45 m. beneath the level of the floor and 0.11 m. beneath Burial 1. Burial 2 is an adult female, approximately 35 $\pm$ 2 years of age, as determined by the analysis of the pubis symphis and by other less exact methods. The condition of the burial is excellent, and all bones are present. The skeleton was found in a semi-flexed position, lying on its right side with its head to the west, facing south (Fig. 32). Citing Trotter and Gleser (1952:496) and Genovas (1966:41), Bass (1971) presents calculations for determining the stature of a living adult from skeletal material. The individual represented by Burial 2 stood, on the basis of these calculations, approximately 155 $\pm$ 3 cm. in height. As in the case of Burial 1, some of the bones of this individual were covered with a red pigment, presumably red ochre or hematite. The pigment was placed on the flesh and not the bones directly as evinced by the occur-

Figure 32. Burial 2, high status adult.

rence of small amounts of reddish stain in the soil surrounding the skeleton.

The quality and quantity of the burial goods found with Burial 2 sets the burial apart from any other in the Mesa Verde area. Found with the burial were three elaborate pendants (Figs. 23 and 25), six humerus scrapers, 6,900 turquoise, jet, and shell beads (Fig. 22), three turquoise and shell mosaics, two ceramic vessels (Figs. 18 and 19), impressions of a burial mat, several obsidian and chert flakes, and some fragments of unmodified animal bone. The three pendants, described in detail in Chapter III, were found in a manner suggesting that they were probably suspended around the body's neck. The frog effigy pendant was found near the sternum (Fig. 33). One of the two medallion-shaped pendants was found under the chin, and the other was near the right shoulder of the skeleton (Fig. 34). Of the thousands of beads, many were strewn throughout the grave, but most were concentrated around the face of the deceased. Some were found in their original pattern, indicating that many of the beads were worn as a necklace. Others were found in the base of one of the ceramic vessels in a random order.

The two vessels definitely associated with Burial 2 consist of a McElmo Black-on-white bowl. The pitcher had been placed inside of the bowl, atop hundreds of beads found therein. The six humerus scrapers were placed together in a cluster, all oriented with the articular heads to the west, next to the skeleton's right arm. A burial mat was placed atop the body, as evidenced by fragments of basketry impressions over portions of the skeleton. The original material, probably Phragmites sp., had completely decomposed, leaving only a white-colored residue. Also near the right elbow was found one of the three mosaics. The other two were found beneath the McElmo Black-on-white bowl near the skull.

Figure 33. Frog-effigy pendant on Burial 2.

Figure 34. Shell, specular hematite, and turquoise pendants on Burial 2.

Burial 3

Tucked into the southeast corner of Room 2 was the burial of a child. The child, based on the degree of fusion of the epiphysial plates, the eruption of the 6 year molar, and other dental features, is thought to have been 7 years old at death. The burial has been disturbed by rodent activity, as evidenced by the presence of a few of the child's bones in an adjacent room. The sternum, patellae, hand, and feet bones were never found. The bones present are in fairly good condition. The child was found in a fully flexed position, with the legs drawn tightly up to the chest and under the skull. The skeleton was laying slightly on its right side, with the head to the southwest, facing upward and toward the east (Fig. 35). No pigment was found on the bones, and no grave goods were associated with the burial.

Isolated Human Remains

Three isolated human bones were recovered during the course of excavations. A left talus of an adult individual was found in two pieces in Room 3. One piece was found in the fill, and the other piece was found upon the floor and was designated Floor Artifact #17. In the lower portions of the kiva fill were found a badly eroded mandibular fragment, with parts of a molar intact, and also a proximal fragment of a femur. The femur is adult sized, but may not have been completely fused at the epiphysis. No pathologies were observed on any of the isolated human bones.

Anthropometry

Tables 19 and 20 present the available anthropometric data for Burials 2 and 3. No measurements were made for the infant

Figure 35. Burial 3, child.

TABLE 19

CRANIAL MEASUREMENTS

	Burial 2	Burial 3
Maximum length*	16.60	12.0°
Maximum breadth*	14.35	15.5°
Minimum frontal	9.45	9.3
Basion- bregma	13.85	- -
Circumference*	48.40	47.0
Auricular height*	11.45	- -
Total facial height	11.45	- -
Upper facial height	7.20	5.6
Bizygomatic breadth	12.50	- -
Nasal height	4.60	4.4
Nasal breadth	2.65	2.2
Nasion- basion	9.45	- -
Basion- prosthion	9.45	- -
L. Orbital height	3.70	3.5
R. Orbital height	3.55	3.7
L. Orbital breadth	3.60	3.8
R. Orbital breadth	4.10	- -
Inter- orbital breadth	2.35	2.0
External palate length	- - +	3.7
External palate breadth	5.40+	5.7
Interior palate height	1.60	1.2
Mandibular length	10.60	7.9
Bicondylar breadth	12.60	9.6
Bigonial breadth	10.25	8.5
L. Ramus height	6.50	4.3
L. Ramus minimum breadth	3.92	2.7
Symphyseal height	3.35	2.2
Inter- foraminal breadth	4.75	4.0
Coronoid height	5.90	4.2
Body thickness	1.65	1.45
Indicies:		
Cranial	.864	1.29°
Height length	.834	- -
Height breadth	.965	- -
Upper facial	.576	- -
Total facial	.916	- -
Nasal	.576	.50
Orbital	1.020	.92
External palate	- -	1.52
Mandibular	.841	.823

* = skewed due to artifical deformation
\+ = distortion due to pathology
o = distortion due to post mortem deformation
-- = absent or damaged

TABLE 20

BURIAL 2, POST-CRANIAL MEASUREMENTS

Humerus length	R	29.9
	L	30.4
Max. head diameter	R	3.7
	L	3.7
Distal end breadth	R	5.3
	L	5.6
A-P mid-shaft diameter	R	1.9
	L	1.8
M-L mid-shaft diameter	R	2.1
	L	2.1
Ulna length	R	24.9
	L	25.2
Trochlear notch height	R	2.4
	L	2.3
Distal end breadth	R	1.9
	L	1.9
Radius length	R	23.3
	L	22.9
Max. head diameter	R	2.1
	L	1.9
Distal end breadth	R	2.7
	L	2.6
Femur length	R	40.8
	L	40.7
Bicondylar length	R	40.2
	L	40.5
A-P sub-trochanteric diameter	R	2.8
	L	2.9
M-L sub-trochanteric diameter	R	3.9
	L	3.8
A-P mid-shaft diameter	R	2.6
	L	2.7
M-L mid-shaft diameter	R	2.3
	L	2.3
Max. head diameter	R	3.9
	L	3.9
Epicondylar breadth	R	7.1
	L	7.0
Tibia length	R	34.0
	L	34.0
Physiological length	R	33.3
	L	33.2
Max. diam. proximal end	R	6.6
	L	6.6
Nutrient foramen A-P diam.	R	3.1
	L	3.1

(Continued)

TABLE 20--Continued

BURIAL 2, POST-CRANIAL MEASUREMENTS

Nutrient foramen M-L diam.	R	2.1
	L	1.9
Fibula length	R	32.0
	L	32.6
Clavical length	R	14.1
	L	13.6
Innominate height	R	19.3
	L	19.6
Innominate breadth	R	13.2
	L	13.9
Max. pelvic breadth		24.8
Sagittal diam. of pelvic inlet		9.9
Transverse diam. of pelvic inlet		13.6
Sagittal diam. of pelvic outlet		--
Transverse diam. of pelvic outlet		13.5
Sacral height		--
Sacral breadth		12.5
<u>Indices</u>		
Radius-Humerus	L	.75
	R	.78
Humerus-femur	L	.75
	R	.73
Platymeric	L	.76
	R	.72
Pilastric	L	1.15
	R	1.11
Platycnemic	L	1.63
	R	1.51
Tibia-femur	L	.83
	R	.83

TABLE 21

NON-METRIC OBSERVATIONS

	Side	Burial 2	Burial 3
Os Inca		A	P
Lambdoid ossicles		A	P
Tympanic dehiscence	R	A	A
	L	A	A
Supra- orbital foramen, closed 1	R	P	P
	L	P	A
Supra- orbital foramen, notch	R	A	P
	L	A	A
Accessory mental foramina	R	A	A
	L	A	A
Accessory infra- orbital foramina	R	A	A
	L	A	A
Metopic suture		A	A
Parietal foramen	R	A	P
	L	A	P
Mandibular torus		P	A
Mastoid torus		P	- -
Pierced olecranon fossa, humeri	R	A	A
	L	A	A
Third trochanter, femora	R	A	A
	L	A	A
Zygo- maxillary tuberosity	R	P	- -
	L	A	- -
Squatting facets, tibiae	R	P	- -
	L	A	- -

A = absent
P = present
- - = no observation, damaged or missing
R = right
L = left

burial (Burial 1) as neither the skull nor any of the post cranial epiphysial plates had fused. Cranial measurements only are presented for Burial 3, as again, epiphysial fusion had not begun on the long bones. Both cranial and post cranial measurements are presented for Burial 2.

Anomalies

Subjective non-metrical observations were made on the three burials, and are presented in Table 21. In addition to the data presented therein, it should be noted that Burials 2 and 3 have slight chin projections, no palatal tori, U-shaped palates, and elliptic auditory meatuses. All burials have bilateral chin forms. Burials 1 and 2 have elliptic eye orbits, while Burial 3 has round rhomboid eye orbits. Burial 2 also has an X-shaped pterion and a slight development of the supraorbital ridge. Artificial deformation of the occupital is evident in Burial 2, and indeterminable in Burials 1 and 3 due to the lack of suture fusion and postmortem deformation.

Pathologies

Burial 1

Bilateral osteoporosis (cribra cranii) was observed on the parietals of the infant skull. Zaino (1967:40-42) writes that the cause of symmetrical osteoporosis is unknown, but that nutritional deprivation alone is an unlikely explanation. Carlson et al. (1974) has linked symmetrical osteoporosis to iron deficiency anemia, and Angel (1969) associates the pathology with hemolytic blood disorders. A brief survey of the literature on Anasazi pathologies indicates that symmetrical osteoporosis is a rather common feature of the burial population.

An analysis of X-ray exposures taken of Burial 1 reveals, even at the infant's young age, Harris or growth arrest lines. These lines, which appear as faint transverse lines of dense calcification across the long bones, indicate periods where the individual nearly stopped growing. Wells (1964:155) writes:

> If during development, the bone is subjected to any adverse influence this process of active proliferation is disturbed and the growth cartilage remains dormant for an indefinite time depending on the kind of injury. This may be a short acute illness such as pneumonia or enteritis, or a more protracted episode such as a period of famine especially, perhaps, protein starvations.

Growth arrest lines of course only reflect trauma experienced before one reaches adulthood. The lines are usually permanent, but tend to fade with age. The infant of Burial 1 experienced one, or possibly two, periods of arrested growth before death.

No evidence of bone injuries or of diseases other than those mentioned above were observed on Burial 1.

Burial 2

The individual represented by Burial 2 appears to have enjoyed reasonably good health. No bone injuries or diseases were detected from the skeletal analysis. The individual did possess a slight degree of lipping along the margins of the bodies and on the articular surfaces of the toracic vertebrae, but these, according to Dr. Dennis Van Gervin (personal communication), are evidence of arthio-arthritis, a natural and non-pathological breakdown of the cartiledge system with age. X-rays revealed at least two periods of growth arrest during Burial 2's childhood. Two Harris lines were visible on the right tibia and the left femur. Birthing trauma was evident on the innominates.

Burial 2 possessed shovel-shaped incisors and predominately a 4-Y cusp pattern. Attrition of the teeth was moderate; the incisors

and premolars were worn into the dentine, but the molars showed a lesser degree of wear. Little was observed in the way of calculus deposits, and alveolar resorption, which is associated with periodontal infection, is slight. One case of protostylid was found on the second molar on the left side. Four cases of chronic dental abscesses were noted, resulting in the antemortem loss of the first maxillary molars bilaterally, the second maxillary premolar on the right side, and the third maxillary molar on the left side. In addition, the first mandibular premolar on the right side is abscessed, as well as possessing an advanced occlusal carie. Interdental carries are present on the second mandibular molar on the right side and the second maxillary premolar on the left side, with the latter in an advanced stage. Occlusal caries are present on the first maxillary premolar and the third mandibular molar. The third mandibular molar, in addition to the carie, is impacted and peg-shaped. The maxillary and mandibular second and third molars on the right side, the maxillary second molar on the left side, and the mandibular third molar of the left side all have fused roots.

Burial 3

Burial 3 possessed no apparent bone injuries, but did exhibit obvious symptoms of cribra orbitalis, a symmetrical osteoporosis centered in the eye orbits. Additionally, at least 3 growth arrest lines are visible on X-ray exposures of the tibias and femurs. The growth arrest lines on these bones seem to spacically correlate with each other. The child possessed on occlusal carie on its left maxillary second milk molar, and one supernumerary milk pre-molar. The milk incisors and canines were worn down to the dentine, but the permanent teeth lacked attrition.

CHAPTER VI

INTERPRETATIONS

The Relationship Between the Dominguez Ruin and the Escalante Ruin

If one is to understand the nature of the relationship between the Dominguez Ruin and the Escalante Ruin, it is first necessary to examine both sites within a larger framework. As mentioned in preceeding chapters, the Dominguez Ruin seems to generally conform with other sites in the Mesa Verde area of the same time period. The Escalante Ruin, on the other hand, does not conform so readily. Of primary importance is understanding the relationship between the two sites is examing the Escalante Ruin as a Chacoan outlier. If the Escalante Ruin is indeed a site-unit intrusion instead of an indigenous development shaped by intrusive trait-units, then the implications of the inter-site relationship may be most profound.

Architectural evidence indicates that the Escalante Ruin is actually site-unit intrusion. When discussing site-unit intrusions as opposed to trait-unit intrusions in general, Collins (1975:19) points out that the distinction is both qualitative and quantitative; the greater number of distinctive normative traits and the more extreme the differences between a given site and surrounding sites, the more likely it would be classified as an intruded site unit. Architectural features of the Escalante Ruin are notably atypical of the Mesa Verde area and compare favorably to only five other sites in Southwestern Colorado, namely the Lowry Ruin (Martin 1936), Chimney Rock Pueblo (5AA83) (Eddy 1977), the Ida Jean site, the Wallace Ruin (Bradley 1974), and Yucca House (Gillespie 1977). In addition to these Colorado sites, 15

other Chacoan outliers have been identified in the northwestern New Mexico and northeastern Arizona (Dr. James Judge, personal communication). Judge (personal communication) finds that Chacoan sites are characterized by the following criteria:

1. Symmetrical ground plan, including a single, massive roomblock (often "D" or "E" shaped).
2. Probability of multiple stories.
3. Compound, or rubble and veneer masonry.
4. Relatively large rooms, with high ceilings.
5. Ceramic assemblages roughly equivalent to Bonito Phase assemblages in Chaco Canyon (Red Mesa Black-on-White, Gallup Black-on-White, Chaco Black-on-White, and equivalent carbon paint types).
6. Possible association with a great and/or tower kiva.
7. Possible association with a roadway.

The Escalante Ruin fits some of the criteria listed above, but does not possess a great or tower kiva or a roadway (Nemetz 1977). Several other characteristics seem applicable to all of the Chacoan outliers presently identified in Colorado. First, all five sites are located atop a hill or ridge with a commanding view of the surrounding area. This may have facilitated long distance visual communication. The settlement pattern evident here may be an important characteristic, because if physiographic variables are constant, differences between the settlement patterns of different communities, such as a Chacoan outlier and the surrounding indigenous pueblos, may be explained as differences between cultures. "Similarities in settlement patterns can be explained by similarities in beliefs, customs, and social organization" (Collins 1975:20). The excavated sites of Chaco affiliation (all except Yucca House have been at least partially excavated) also have kivas that are enclosed in the roomblock proper and are confined within a masonry quadrangle with artificial fill placed between the walls of the quadrangle and the kiva walls.

Kiva features such as "floor vaults," sub-floor ventilator shafts and low pilasters with beams in association frequently occur in these sites.

Within a radius of 300 m. of the Escalante Ruin, at least one half dozen small Azasazi pueblos, including the Dominguez Ruin, are found. These sites, like the Dominguez Ruin, are situated at the base of the hill atop of which the Escalante Ruin is located, or on benches along the hillside. Most of these sites are on private lands, and so have not been recorded or analyzed properly. A brief visit to these sites by this author leads him to believe that thay can be classified as Pueblo II or Pueblo III Period sites, and may well represent a "community" of sorts, contemporaneous with the Escalante Ruin. That the Dominguez site is contemporaneous with the Escalante Ruin seems reasonable, as the percentages of ceramic types are essentially the same, stone petroglyphs of similar nature are found at both sites, and dendrochronological dates are fairly close. According to Judith Nemetz (personal communication), much of the building at the Escalante Ruin occurred in the late 1130's A.D. The Dominguez Ruin, as mentioned in Chapter II, was built approximately 1123 A.D. Evidence less difinitive in nature, such as that little or no building stones were robbed from the Dominguez Ruin for construction elsewhere, supports the assumption of contemporaniety. The model presented here, with small indigenous sites surrounding a Chacoan outlier, may represent the settlement patterns around many, if not all, Chacoan outliers. Robert Powers (personal communication) states that at three Chacoan outliers intensively surveyed in the Chaco basin of New Mexico, small Hosta Butte phase villages, with their "just plain-folk architecture" were found clustered around the large outlier towns.

The nature of the interactions between the Chacoan outliers and indigenous sites is difficult but certainly not impossible to determine from the archaeological record. That the small sites functioned as field houses for the large outliers seems unlikely. While the Dominguez Ruin is adjacent to an arable tract of land, its proximity to the Escalante Ruin (ca. 150 m.) makes its value as a fieldhouse questionable. The Dominguez Ruin also has a kiva, a feature whose presence implies more than just a temporary occupation. Artifacts appear to represent a full gamut of activities, and seem to be similar in frequencies to other Mesa Verde area sites which definitely were occupied the year round. On the other hand, the relative dearth of firepits leads one to wonder about heat production in the habitation rooms in the winter months; the only explanation offered here is that there could have been a firepit in Room 2, before the interrment of the three burials destroyed the floor and its features.

Of increasing popularity is the hypothesis that the Chacoan outliers, as well as the large town sites within Chaco Canyon, functioned as part of an extensive trading network which pervaded the entire Gran Chichemaca (cf. Di Peso 1974; Kelley 1975). Whether small groups of actual pochteca from Mesoamerica were inhabiting sites in the San Juan area or whether the pochteca were merely trading with local traders at special centers and living elsewhere is of course uncertain.

Kelley (1975) better defines these alternatives in discussing the concepts of "soft diffusion" and "hard diffusion". The former concept involves group-to-group migration involving the actual presence of members of the donor culture in the recipient culture (Kelley 1975:184). The impact of both types of diffusion may be highly variable. In any case, the trading centers, in the form of the Chacoan outliers, possessed architectural and artifactual

attributes unique to the surrounding area. These unique attributes may have facilitated practical benefits, such as the storage and redistribution of trade items, or may have functioned more to display wealth and status.

Frisbie (1972) suggests that Chacoan outliers "represent a colonization by an expanding Chacoan population, due in large measure to the improved quality of hybrid forms of maize, as well as for the exploitation of a variety of natural resources occurring in close proximity to the satellite sites. The resources, per se, could easily have included minerals (particularly those prized for ornamental and/or ceremonial use especially turquoise, paint pigments, salt, and others), feathers, hides (and meat), timber (possibly a variety of wood in general), and plants (a great variety would have been available since varying ecological situations exist at different satellites)." In short, Frisbie makes a case for a more localized trading network, with the outliers serving the core area of Chaco Canyon. Trading activities from other cultures would ultimately have been funneled into Chaco Canyon.

The material remains excavated from the Escalante Ruin and other outliers suggests that if such a trade network was of major importance to the sites, mostly perishable items, which have since left little or no trace, must have been the primary items in circulation.

Some sort of trade network was undoubtedly operating in the Southwest in Pueblo III times (and beforehand as well), as evidenced by the widespread occurrences of turquoise, shell, jet, and lithic material, in addition to copper bells, macaws, mosaics, pyrite mirrors, and other objects in certain areas of the Southwest. If the Escalante Ruin was actually a satellite for a larger

trading complex, small sites may have been constructed by local peoples around the outliers to somehow benefit from the outlier's presence. The benefits received by the villages surrounding the presumed trading centers are difficult to ascertain. The Hosta Butte Phase sites of Chaco Canyon lack exotic items such as cylindrical jars, mosaics, quantities of turquoise, inlaid representations, cloisonne, copper bells, and macaws (Vivian and Mathews 1973) that were found in the town sites just a few hundred meters away. As mentioned above, the Dominguez Ruin lacked exotic items excepting those found with the burials. These grave goods, as will be discussed below, are thought to have emanated from the Escalante Ruin and did not belong to the inhabitants of the Dominguez Ruin. The benefits received by the inhabitants of the Dominguez site may have been, therefore, in the form of trade items other than ornaments and the like. It is possible that certain food items were prepared at the Dominguez Ruin for export, although pollen and seed analysis do not support this speculation.

Explanations other than the pochteca model may be useful in understanding the presence of outliers in Colorado. It seems feasible that while Escalante Ruin may have had some trading relations with Chaco Canyon, the site itself may have been settled for reasons entirely removed from trade. The outliers may have made attempts to lessen population pressures on the Chaco Canyon center, which were possibly considerable in Chaco Canyon during the major construction periods in Pueblo II and III phases. The population of the Mesa Verde area, on the other hand, evidently had begun to decline by the advent of the Pueblo II period (Hayes 1964), so that area may have possessed sufficient arable land to provide for the incoming migrants. It should be noted, however, that whatever the cause of the decline in population in the Mesa Verde area, it would probably produce and equal impact on the

Chacoan immigrants. If the immigrants did indeed find a suitable homeland in the Mesa Verde area, and trade was of minimal importance, then the impact on the indigenous Mesa Verde people would possess characteristics much different from those resulting from the pochteca model mentioned above. The Chacoan outliers would have been in competition for resources with the indigenous Mesa Verde peoples, and so the likelihood of the settlement pattern resulting, with the small indigenous sites clustering around the outliers, seem slight. It should be reiterated, however, that in the vicinity of the Escalante Ruin, analysis establishing the contemporaniety of the sites other than the Dominguez Ruin with the outliers has not been attempted.

Regardless of the reasons why Chacoan outliers were constructed in the Mesa Verde area, one interesting possibility concerning the nature of the relationship between the peoples involved should be mentioned. The Chacoan outliers may have been constructed for and utilized by individuals or lineages of higher social status than those people inhabiting the nearby sites. Proposing a similar explanation for the occurrence of Hosta Butte Phase and Bonito Phase sites in Chaco Canyon, Martin and Plog (1973:305) write:

> One hypothesis for explaining the great towns on one side of the wall and small contemporaneous villages on the other, is that the elite lived in the great towns (where the goods were found), and the less important people occupied the smaller one-story villages.

Plog (1974:128) adds that the differences between the two types of sites must have been organizational.

If there was a distinct difference in the level of social organization between the Chacoan outliers and the nearby villages, then the major benefits obtained by the village inhabitants may have been in the form of organization rather than in material items. In the following portion of this chapter, an attempt will be made to show that the Chacoan outliers possessed a ranked level

of social organization. If this can be done successfully, then the hypothesis that the village sites benefited via the outliers' higher level of social orangization will be supported.

The Social Organization of Chaco Outliers

> Statuses: Different categories of individuals, residence units, or sodalities that serve in the organization of interpersonal and inter-institutional behavior. They may be divided into achieved and ascribed statuses. Statuses may be distinguished on the basis of age, sex, group membership, specialization and so forth (Hill 1970:16).

Social categories can imply a great deal about the social organization of a culture. An analysis of the rigidity of the social distinctions between members of separate statuses, of the degree of authority and/or power members of one status may have over members of other statuses, and of the manner in which statuses are conferred upon members of subsequent generations may provide the best indication of the level of social organization possessed by a society.

Ascertaining such social distinctions from the archaeological record, is, at best, difficult. While various phenomena discovered in the course of an archaeological excation may appear indicative of the superorganic features of the extinct culture, it is ethnographic analogy that provides the best possibilities for the interpretation of these findings. If an attempt is to be made in determining the level of social organization attained at the Chacoan outliers of Colorado, then an examination of some of the social characteristics common to ethnographically described societies of various levels of social organization is in order.

Egalitarian Societies

As the term implies, an egalitarian society is one in which

ranking and stratification are absent, with leadership positions being informal and based solely on the personal attributes of an individual. The "leader" is indeed one held in somewhat higher esteem than others within his society, but his position is based solely on his strength, his prowess as a hunter or warrior , or his generosity, and remains intact only as long as his virtue is recognized. The leader has authority rather than formal status (Service 1975), which is based on community respect. While one may be a leader in one activity or situation, different demands by different activities may thrust another person into a position of leadership. As Service (1975:52) points out, there are instances in which an individual combines a high degree of skill, judgement, and other virtues to such an extent that he may be deemed a leader in a variety of contexts, giving him the appearance of a full "chief". Even in such a case, points out Service (1975), the leader does not occupy an office, which is a permanent position in the society. Leaders in an egalitarian society do not occupy permanent or pervasive position; one leads only as long as others in his band or tribe wish to follow, and without the "ego-satisfying embellishments that go with, and mark, hierarchical authority positions" (Service 1975:55). There can be as many "leaders" within a society as there are people with the desired attributes.

Status distinctions in egalitarian societies are usually based on age and sex. More status is usually conferred upon the male rather than the female gender (Service 1975:55), and men, not women, usually occupy the political-like situations (1975). "Status symbols" are possessed by nearly all individuals within age and sex classes, and differentiation of such symbols within a class are quantitative and qualitative, rather than a result of formal exclusion of particular forms to particular status grades (Binford 1962:222).

The redistribution system finds its simplest expression in the egalitarian society. Redistribution of products occurs primarily at the faimily level, and according to Fried (1974), can grow no more elaborate than the pooling and redistributing of products to the extended family. The economy of the egalitarian society, like the system of leadership, remains at a relatively simple level, and involves a limited number of people.

Ranked Societies

A ranked society, or chiefdom, is defined by Service (1962: 164) as follows:

> A chiefdom is largely familistic but is not egalitarian; it has no government but does have authority and centralized direction; there is no private property in resources or entrepreneurial market commerce, yet there is unequal control over goods and production; there are rank differences but no clear socioeconomic or political classes.

The major difference between an egalitarian society and a ranked society, then, is the presence of a permanent central agency for coordination of community activities, which facilitates another very important feature of ranked society--economies based on redistribution. Methods of food production may remain the same in a ranked society as in an egalitarian society, and the standard of living generally remains equal (Fried 1967). While all individuals within a ranked society retain access to the basic resources for survival, there is a tendency for the accumulation of consumer's property, as patterns of reciprocal exchange do not operate to keep non-strategic items in circulation (Fried 1967). As a result, possession of certain non-economic items may be used to demonstrate, to the community at large, rank distinctions. Service (1962) writes that specialization in production may be more apparent in chiefdom societies than in band or tribal societies, yet seldom is there a particular technological innovation marking the distinctions.

In a ranked society, there are fewer positions of valued status than there are people capable of handling them (Fried 1974). These valued positions or "offices" are distinct socio-political structures, and have ascribed functions and conventional attributes regardless of who may occupy them. While these "offices" cannot be described as being part of a government per se, they do represent a step up from the familistic customs and informal public sanctions characteristic of an egalitarian society. According to Service (1975:90) chiefdoms have "the most necessary ingredient of law, a central authority that can create rules for behavior, and judge breaches of them." The sphere of influence possessed by a leader in a ranked society, while substantially greater than that of an ephemeral leader in an egalitarian society, is limited. The leader may lead, but it remains up to the community whether or not they follow. The leader does not possess the gamut of coercive powers possessed by stratified societies, partly as a result of his not having differential access to and control over strategic resources, as is characteristic of leadership positions in stratified societies. Authority is exerted regularly and repetitively, and extends into many spheres of social life. Its influence within the ceremonial sphere frequently results in the political leaders assuming priestly-type roles, producing a theocracy of sorts. When an incipient theocracy results, "offices" of leadership have been incorporated into the ideology of the society to the extent as to make possible a still more complex level of social organization.

As mentioned above, members of a valued position may accumulate non-strategic items as visible symbols of their status. These signs of prestige, however, have limited functions, as they cannot be used to acquire foods or productive resources (Fried 1967). There is little or no infiltration of items from one so-

cial sphere to another (Fried 1967).

Perhaps one of the greatest advantages a centralized system of leadership has over an egalitarian system is its capability to raise and direct a work force and so intensify production. Flannery (1972:48) goes so far as to say that primitive agriculturalists [egalitarian] are not limited so much by their technology, as they are by the lack of centralized authority. Intensification of productivity in part results from getting more people to work, in a more organized fashion. In an egalitarian society, work parties are usually small in size. If large work parties are assembled, they usually exist for short periods of time; subsequent reassembly is likely to produce a group with different membership with possibly even a different leader (Fried 1967:133).

A leader in a ranked society has the authority to organize large work parties for cultivation, irrigation maintenance and construction, and for other massive public works. Membership in such work parties is usually determined by sex and age, and ultimately, is largely voluntary. The leader is by no means free from laboring himself; indeed, he usually is expected to work harder than anyone else (Fried 1967).

Another advantage a ranked society has over an egalitarian society is that the former has the social mechanisms necessary to maintain a fairly large community. When intra-village stress appears in egalitarian societies, fission is usually the result. Flannery (1972:47) emphasizes that a strong polity, rather than factors such as agricultural potential, allow for the maintenance of intra-village peace after a village has grown large. Centralized authority also plays an important role in inter-village relations. War can be planned and waged more effectively; like-

wise, peace and agreements between villages can more readily be enforced.

Chiefdoms are primarily redistributional societies (Service 1962, and the positions of high rank are intimately involved in the redistribution of produce within the community. The presence of a permanent redistribution system not only functions to more systematically distribute and store foodstuffs, but also reinforces and maintains the ranked social structure itself. When a few individuals are in control of the redistribution of strategic materials, the possibility for social control via withholding goods from dissident groups is present (Service 1975). The necessity for a redistribution system is usually thought to result from a local specialization of production--often an advantageous adaptation in areas of environmental diversity--with its concomitant need for the distribution of produce and other goods throughout the entire community (cf. Sanders and Price 1968: and Service 1962).

Another important factor concerning the development of a ranked society is population density. Sanders and Price (1968:84) write:

> Organizational stresses occur as a society increases in size; size is broadly limited by population density and such stresses stimulate the development of more effective systems of social control. Considered in this sense, social systems are adaptive systems that may be viewed as both causes and effects of population growth.

Sanders and Price (1968), then, view population growth as a major stimulus toward more complex levels of social organization, and also propose a "close correlation" between the rapidity of population growth and change within social systems.

Ethnographically, the chiefdom level of social organization was very widespread, possibly because of its increased efficiency

when compared to an egalitarian society (Service 1962). Service (1975:79) suggests that egalitarian societies, when thrown into contact with a ranked society, were either transformed into a ranked society by the latter, or transformed themselves in emulation. This could possibly explain what Service (1975:79) sees as rapid appearances and dispersion of chiefdoms in the archaeological record.

The Ethnographic Pueblos

Traditionally, Southwestern archaeologists have turned to historical descriptions of the Pueblo Indians for their ethnographic comparisons, rather than utilizing "general comparative analogies" (Willey 1974), such as those offered by Service (1962, 1975) and Fried (1967). While Pueblo informants and ethnographic accounts of the Pueblos have been of tremendous value in the analysis of archaeological material culture, there are some (most notably Dr. Susan Collins, personal communication) who are finding the "specific historical approach" to be inadequate in dealing with questions concerning Anasazi social organization.

The Pueblos are what Gillespie (1976:188) calls a "classic example of socio-politically egalitarian agricultural adaptation without a dominating redistributive economy"--which certainly cannot be considered a ranked society in the truest sense. Still, there are individuals with political power. Dozier (1970:128) writes of "chiefs" and "priests" among the Rio Grande Pueblos being able to compel villagers to engage in secular and ceremonial activities, under the threat of physical punishment or banishment and confiscation of property. Nonkinship sodalities, organized into two basic divisions, govern the Rio Grande Pueblos. The Western Pueblos, including the Hopi and Zuni, are governed more at the clan level, and are thought to better represent what might

have been the social organization of the Anasazi, due to less contact with Europeans and American invaders. In brief, the Rio Grande Pueblos have features of egalitarianism combined with certain inegalitarian offices, and are considered more influenced by historic contacts with European culture than the Western Pueblos.

The social organization of the somewhat more "pristine" Western Pueblos still does not fit the archaeological record for certain phases of Anasazi development, however. As Vivian (1959) points out, nowhere after the point of historic contact are found great kivas, double and tri-walled structures enclosing kivas, and extra-pueblo structures supported by more than one village. Furthermore, burial practices were different prehistorically than at present:

> The numerous objects of art found in graves on prehistoric sites show that in the past it was customary to bury valued possessions with their dead, but this is not done at present, although occasionally one or two trifling articles are placed in the grave (Stevenson 1904:306).

Archaeological evidence indicates that after the end of the thirteenth century, the Anasazi had completely abandoned the San Juan region and had moved southwards, probably into areas of New Mexico and Arizona. This movement south, according to Dr. Susan Collins (personal communication) was probably a revitalization effort precipitated by unfavorable environmental conditions in the San Juan region. Such an effort alone would have a profound impact upon the culture, due to the incredible stress involved with being forced to emmigrate in order to maintain a certain life-style. Within a relatively short time after the movement south, other external factors exerting tremendous impact upon the culture occurred. Athabascan-speaking peoples entered the area, and then Spanish conquerors with their horses and culture exacted their toll from the Pueblo society. Anglo explorers, traders,

and later colonists followed, imposing their system of government upon the Pueblos. It seems most unlikely that the social organization of the Pueblos would remain similar to that of their prehistoric antecedants through all of this turmoil. The models of social organization offered by the "general comparative" approach, therefore, seems the most useful when dealing with the Anasazi.

The Archaeological Record

The two most basic social entities that distinguish a ranked society from an egalitarian society are status distinctions based on attributes other than personal qualities, and relatively complex systems of redistribution. Archaeological data from southwestern Colorado and northeastern New Mexico strongly suggests that the Anasazi culture possessed both of these social entities by the Pueblo III Period.

Status Differentiation

Obviously the most direct evidence needed to demonstrate archaeologically the existence of a few number of Anasazi possessing authority and prestige far above that of the rest of the population would be to discover an elaborate burial with a veritable crown on its head. Excavations at the Dominguez Ruin, Aztec, Pueblo Bonito, and a few other sites have essentially accomplished just that.

Hill (1970:46) defines high status burials by the following attributes:

(1) quantitative and qualitative differences in grave goods
(2) variation in burial location
(3) variation in burial position
(4) variation in the burial pit

(5) stylistic differences on ceramics and other goods

(6) spatial placement of grave goods.

The attributes above indicate that Burial 2, and possibly even Burial 1 from the Dominguez site are high status burials. The number and quality of the grave goods associated with Burial 2 strongly asserts the individual's uniqueness and esteem in which he was held by his community.

While the ceramic artifacts associated with Burial 2 and the burial pit itself do not appear stylistically different from other Mesa Verde burials, the location of the burial and possibly even the placement of the grave goods therein may be quite unique. Burial 2 may represent an individual who in life dwelled at one site, and who was buried beneath a floor on an entirely different site. It is of course difficult to determine this with any certainty, but the evidence in this case seems substantial. There are two viable possibilities as to where the individual represented by Burial 2 may have lived: either at the Dominguez Ruin, or at a site heavily influenced by the towns of Chaco Canyon. If the individual was entirely associated with the Dominguez site, then it must be explained how such an incredible amount of material wealth came into the possession of a member of such an unimpressive, four room pueblo. The ornaments with which this individual was buried, it must be noted, qualitatively surpass those found in other Chacoan outliers and most of the great Chaco towns, let alone those few ornaments found on the Mesa Verde. It seems far less radical to assume that the individual represented by this burial was, instead, a highly ranked member or distinguished visitor to the Escalante site, and somehow played a part in the trading network established by the Chacoans. Burial 2, then, becomes one of perhaps a half-dozen high status burials associated with Chacoan towns and outliers, instead of the one and only

decidedly high status burial in the Mesa Verde population.

If indeed Burial 2 was once associated with the Escalante Ruin, it seems likely that the Dominguez Ruin was abandoned before the burial's interrment. The room itself was certainly abandoned, as no floor surface was prepared above the burial pits. The nature of the fill above the burials indicates that little or no destruction had affected the pueblo before the burials were interred.

As mentioned above, the spatial arrangement of burial goods with Burial 2 may be distinctive. The positions of the vessels, worked bone artifacts, and ornaments seem typical; all were carefully placed in the burial pit around and atop the body. What may be unusual is the location of Burial 1 in relation to Burial 2. The body of this small infant was interred directly above Burial 2, and upon excavation, was separated from Burial 2 by 10 cm. of soil. Burial 1 was interred sometime after Burial 2, but it is impossible to determine just how much time lapsed between the two burials. The mere proximity of the infant burial to Burial 2 suggests that the infant was consanguineously or socially related in some manner to the high status individual.

It seems reasonable to infer that the high status female adult was the mother of the infant represented by Burial 1. If this is the case, then the spatial relationship between the burials need not be considered unusual. If, however, the infant was not the child of the high status adult, then it is possible that it was interred with the high status burial as a result of its own social position.

It is possible that the infant was sacrificed at the time of Burial 2's interrment, and that after that individual was partially buried, the infant's body was placed atop the adult as an offering. Whether the infant possessed a unique social position before

his death is moot. The infant, if sacrificed, probably possessed a high social status after death. It should be strongly emphasized, however, that there was no archaeological evidence pointing to a violent death for the infant. Furthermore, human sacrifice among the Anasazi is virtually if not entirely unknown.

While no undoubted high status infant burials have been recovered in Pueblo III Period Anasazi sites, there are, as mentioned, a few other adult high status burials. The most spectacular of all burials is undoubtedly that of the so-called "Magician" excavated by McGregor (1943) from the Ridge Ruin site east of Flagstaff, Arizona. The Aztec Ruin (Morris 1919), a Chacoan outlier, produced several possible high status burials, most of which included the remains of two or more individuals. These burials contained a great amount of burial goods. Perhaps the best known burial found at the Aztec Ruin is the "Warrior's Grave", Burial 83 (Morris 1919). This burial contained a "shield", digging sticks, seven bowls, five awls, several arrowheads, and other items, including 19 "white disks", 8 jet pendants, 2 red disks, and 2 pieces of turquoise. Pueblo Bonito in Chaco Canyon has produced some incredible burials; Pepper (1909) reports that with one burial (Skeleton 13) was found 10 turquoise pendants and 5,890 beads, and with another in the same room (Skeleton 14) was found 698 pendants and over 9,000 turquoise beads, plus numerous tesserae and shell ornaments. Judd (1954:32) adds that Burial 12 from Pueblo Bonito had associated with it a turpquoise pendant, a string of turquoise beads, a basket, some bone tools, and 14 vessels. Burial 12 has been identified as a woman, making it the only other female represented in the individual high status burial population.

The fact that high status burials are found exclusively in association with the great Chaco towns and Chacoan outliers sug-

gests that site stratification was present in Anasazi culture--a characteristic of ranked societies (Sanders and Price 1968). These authors (Ibid:116) present three models of settlement patterns in ranked societies in Mesoamerica, the first being the most typical. They are:

> (1) Ceremonial centers with a civic precinct and very small residential groups made up of the chiefly lineage, plus perhaps a small group of service personnel. The other lineages would be scattered over the countryside in nuclear family, extended family, or lineage settlements. These settlements would support the chiefly lineage by food tribute, and themselves consist of full-time farmers or farmers-part-time-craftsmen with specializations based upon local resources.
>
> (2) The entire chiefdom could have resided in a single, large, compact nucleated center.
>
> (3) A relatively large population could reside at the center with the balance of the population residing in smaller settlements as in (1).

The Escalante site may have functioned, then, as a ceremonial center for the surrounding Mesa Verde sites, just as the large Chaco Canyon towns may have served the small Hosta Butte Phase villages.

In order to discern which of the three settlement patterns described above may have applied to the Pueblo III Period Anasazi culture, population estimates for the Bonito Phase sites and the Hosta Butte Phase sites are required. Drager (1977:167) estimates that the central Chaco Canyon was inhabited by 2,947 Bonito Phase people, and 2,889 Hosta Butte Phase people shortly after 1100 A.D. If these estimates are correct, then the third model presented by Sander and Price (1968:116) above, with large populations residing in the ceremonial centers as well as in surrounding areas, may be the most viable.

Dr. James Judge (personal communication) suggests a hypothesis however, that may cast a different light on the matter. In what he calls the "Dry-Hole" hypothesis, Judge suggests the fact that many Bonito Phase sites have large, but relatively featureless rooms with comparitevely few artifacts may indicate that many of the rooms in these sites may have functioned for other uses besides habitation. If so, then the population of the Chacoan town sites may have been substantially lower than previously estimated, and the concept of a relatively few number of people residing in the ceremonial centers may apply. This hypothesis would explain why the great town sites and Chacoan outliers have far fewer burials than expected (Vivian 1959:53, Judd 1954:32).

Other, less direct evidence implies a ranked society in the Pueblo III period. The existence of monumental public works in the form of irrigation systems (Vivian 1970), inter-pueblo ceremonial structures, and massive town-sized pueblos strongly suggests the presence of well-organized work forces and centralized authority. As has been pointed out in the discussion concerning attributes of ranked societies, worldwide, a centralized authority is instrumental in maintaining large work forces , and is decidedly alien to egalitarian societies.

The extent of the Pueblo III period monumental works should not be underestimated. Pueblo Bonito alone, for example, contained some 800 rooms and covered three acres, according to Martin and Plog (1973:303) The pueblo was not the result of amorphous growth, either. A brief examination of the floor plan of this structure clearly suggests that a definite plan of sorts was followed in its construction. Underlying parts of Pueblo Bonito are the remains of an extensive foundation system that was constructed and then, for some unknown reason, was abandoned without ever having walls built atop it (Judd 1964). The foundation's construction implies

the presence of a large labor force, and its abandonment in favor of another foundation constructed but a few meters away implies a decision-making body not found in egalitarian societies. Gillespie (personal communication) sees the possiblity that a specialized labor force consisting of masons may have been responsible for the construction of many Chacoan towns and outliers. His speculation is based partially on the construction sequence of various sites, in which the progress of this labor force can be traced from one project to another. If further research can substantiate Gillespie's hypothesis, then the model of a ranked Chacoan society will be supported.

The mere size of some of the Chacoan sites suggests a strong polity. As Flannery (1972:47) has pointed out, it is difficult to maintain intra-village peace and so avoid fission without a centralized authority.

The proximity of contemporaneous pueblos and their ability to efficiently utilize inter-village facilities such as great kivas (e.g., Casa Rinconada) and irrigation systems also bespeaks a certain solidarity. Irrigation systems passing through the "territories" of several pueblos would obviously precipitate conflict in times of drought, unless they were somehow regulated.

Redistribution

Attempts to archaeologically define evidence of a relatively complex redistribution system in Anasazi culture have traditionally relied on speculated functions of certain structures. Plog (1974:125) suggests that the enigmatic double and triple walled kivas described by Vivian (1959) served as large storage facilities. Plog (1974) bases his agrument on the fact that the rings of rooms surrounding the central kiva are small (6 m^2) and are

usually featureless. Plog (1974) also writes that the periphal rooms occasionally found adjacent to great kivas may have also served as storage facilities. These rooms, similar to the small rooms in the double and triple walled structures, also tend to be rather small and featureless. While Plog's (1974:123) assertion that, if a redistribution system were to emerge in a society, it would be associated with the existing pan-village institutions (e.g., the kiva) is reasonable, it may be that large centralized storage facilities were unnecessary. In ethnographic examples of ranked societies, frequently there are no discrete, centralized storage facilities encountered (Jack Smith, personal communication). An individual with authority has the ability to allocate goods throughout the community without having to store the goods himself. The necessity of centralized storage facilities is also dependent upon the types of items involved in the redistribution network. If basic items such as foodstuffs are involved, then large storage facilities may be useful. But if the items are in the form of pottery, wood, ornaments and raw material for ornaments, and perhaps even labor, then such facilities would not be expected. The study of the transport of such goods, and not so much of the functions of enigmatic structures, may be the most informative source for understanding the Chacoan redistribution system.

Conclusion

An attempt has been made to demonstrate the possibility that high status social positions and a redistribution system were present in Chaco Canyon and in Chacoan outliers. If these entities were important to the Chacoan culture, then the basic criteria for a ranked society were met in the Pueblo III period. No attempt has been made to explain the need for the development of such a level of social organization, as that task is well beyond the

the limited scope of this report. As with seemingly every other aspect of human behavior, however, such an adaptation was probably an attempt to maintain a certain lifestyle. Change, according to Romer's Rule, is often an attempt to revitalize the status quo. The nature of the stresses impinging upon the Anasazi in the Pueblo II and III periods is debatable. Changing rainfall patterns (Shoenwetter and Eddy 1964) over the centuries of dry land farming may have necessitated the development of new cultivation practices, such as large scale irrigation. Periods of drought and man-caused deterioration of the environment may also have been important factors. Whatever the nature of the stresses affecting the Anasazi, they were substantial. The population of the Mesa Verde reached its maximum during the Pueblo I period (Hayes 1964) and declined thereafter. The population of the Chaco Canyon had declined significantly by sometime around A.D. 1075 (Martin and Plog 1973:305). By the end of the thirteenth century, the Four Corners area was virtually abandoned. Stresses of the magnitude necessitating the abandonment of one's homeland are indeed great.

As Sanders and Price (1968:182) write: "The more severe the conflict, the greater the need for and probably evolution of centralized control."

The excavations at the Dominquez Ruin have hopefully contributed to our knowledge of Anasazi social organization. The small, unimpressive pueblo yielded one of the most impressive burials in the Southwest, which qualitatively and quantitatively is distinct from all but a few other Anasazi burials. If Burials 1 and 2 indeed did emanate from the Escalante Ruin rather than the Dominguez Ruin, then the level of social organization possessed by the inhabitants of the Chacoan outlier may be said to be distinct from that of the indigenous Mesa Verde peoples, when coupled with other architectural and artifactual evidence. The comparatively smaller,

less planned, and less wealthy Dominguez Ruin and other Mesa Verde area sites may represent a less complex level of social organization than the Chacoan peoples.

The settlement pattern present around the Escalante Ruin, as well as at other Chacoan outliers, suggests interaction between the Chacoans and the indigenous peoples. At the Dominguez Ruin, artifacts such as the building stone petroglyphs and architectural features such as the relatively large rooms may be the result of such contact. Notably absent from the Dominguez Ruin, however, is the presence of large amounts of trade items such as pottery and ornaments. The dearth of such items implies that the interaction between the two pueblos may have been more on the social level than on the material level. The Dominguez inhabitants may have benefitted mainly by means of religious and political organization. The Escalante inhabitants may have in turn received perishable resources which in turn may have been transported to Chaco Canyon.

The "Chacoan phenomenon" has been the subject of extensive work in recent years. The relationship between the peoples of Chaco Canyon and the Mesa Verde area is only beginning to be understood. It is hoped that this description of a small Mesa Verde site has shed some light on the broader perspective.

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APPENDIX A

POLLEN ANALYSIS OF DOMINGUEZ RUIN

by

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Introduction

Pollen samples from the Dominguez Ruin, 5MT2148, were taken during archaeological excavations conducted in August 1976, in Montezuma County, Colorado. The project was directed by Dr. David A. Breternitz and was under the field supervision of Alan D. Reed. The Dominguez Ruin, a four-room pueblo and associated kiva, is located three miles west of Dolores, Colorado, on land owned by the Bureau of Land Management.

Nineteen soil samples (Table 1) were submitted for pollen analysis representing the present ground surface, the living surfaces associated with the site, and two stratigraphic columns. Several features were also sampled including: a McElmo bowl associated with Burial 1, a McElmo pitcher associated with Burial 2, and the rib cage area of Burial 2, which is a high status burial. A sample of the adhesive used on a piece of jewelry found with the high status burial was also submitted for analysis.

The variety of pollen sample types was submitted to obtain as much information as possible about the site. General environmental data was sought from the stratigraphic columns, as well as delineation of occupational and post-occupation levels. Flor samples were analyzed with some hope that room function could be assigned in addition to gathering general environmental data. It was also hoped that analysis of the pollen from the various features would give some indication of the economic importance of certain plants at the site and/or reveal cultural uses of specific plants or pollen. The adhesive sample was analyzed in anticipation of finding pollen grains which would indicate the origin of the material. All samples submitted contained pollen suitable for analysis, with the exception of the adhesive sample.

TABLE 1

PROVENIENCE OF POLLEN SAMPLES

Pollen Sample Number	Provenience	Comments
1	Kiva	Contents of McElmo canteen from floor near firepit.
2	Kiva	Floor. 3.82 mbd.
3	Kiva	Floor fill. 3.75 mbd.
8	Kiva	"Roof fall." 3.15 mbd. A lense with charcoal and burned earth.
13	Kiva	Fill. 2.75 mbd. Hard-packed, light brown lens.
18	Kiva	Fill. 2.25 mbd. Hard-packed, darker brown lens.
22	Kiva	Fill. 1.85 mbd (10 cm. below present ground surface).
25	Room 3	Floor. 1.15 mbd.
26	Room 3	Floor fill. 1.05 mbd.
27	Room 3	Fill. 0.95 mbd.
28	Room 3	Fill. 0.75 mbd (15 cm. below present ground surface).
29	Room 2	Floor. 1.30 mbd.
34	Room 4	Floor. 1.10 mbd.
41	Room 2	Contents of McElmo bowl associated with Burial 1 (an infant). Bowl from sub-floor test trench.
42	Room 2	Contents of McElmo pitcher associated with Burial 2 (high status burial). Pitcher from sub-floor test trench.
43	Room 2	Sample from rib cage area of Burial 2, sub-floor test trench. Some beads were included in the sample.
44	Surface	Flat weedy area to the south of the site.
45	Surface	Hillside just above and to the north of the site.

Methodology

The pollen was extracted from soil samples, which due to their low relative percentage of pollen, required some special treatment. A chemical preparation based on flotation was selected as the most effective method of removing the pollen from the large volume of sands, silts, and clays with which they were mixed. This method is less harsh on the pollen grains and more effective than some of the more traditional methods based on the use of HF for extended periods of time.

The following is an outline of the chemical method used to prepare the samples:

1. HCl (10%) was added to approximately 50 ml. of dry sediment (in a 500 ml. beaker) and this mixture was stirred to dissolve any calcium carbonate. HCl was added and the mixture was stirred until there was no further reaction.

2. The material was screened through 150 micron mesh to remove the large particles of sand, charcoal, and small pebbles, after which the material was centrifuged. The screens were examined to insure that the larger grains of pollen were passing through the mesh satisfactorily.

3. Material containing large quantities of charcoal was treated with a 1:1 solution of concentrated HNO_3 and $KClO_3$ (nitric acid and potassium chlorate) for a period of up to 10 minutes. The material was then washed several times with distilled water to remove the acid.

4. The samples were then ready for flotation. Zinc bromide (density 2.0) was used to float all samples. The sample was mixed thoroughly with the zinc bromide on a vortex mixer. This mixture was then poured into a piece of tygon tubing doubled over in a 50

ml. centrifuge tube and centrifuged for 25 minutes at approximately 2,500 rpm. A clear separation between the supernatant (containing the pollen) and the inorganic matter was produced. The supernatant was then decanted and saved. The entire process was repeated at least once, depending on the amount of organic material in the sample. The inorganic residue left after flotation was checked microscopically to insure there was no differential selection of pollen grains in the flotation process.

5. The supernatant was diluted with distilled water and HCl, then centrifuged. The samples were washed with distilled water and centrifuged several more times.

6. Fifty percent HF was added to the samples to remove any small traces of clay remaining after flotation and set in a hot water bath for three minutes. The samples were then washed with distilled water and centrifuged three times.

7. The sediment remaining was acetolated for three minutes and washed with glacial acetic acid. The samples were washed with distilled water and centrifuged approximately six to eight times.

8. Slides were made with glycerine jelly and stained with basic fuschin.

A light microscope was used to count the pollen at a magnification of 430x. Oil immersion at a magnification of 970x was employed occasionally to discern the features of certain pollen grains. A total of 200 pollen grains was counted from each sample, except where otherwise noted. Clumps of pollen comprised of only one type of pollen were counted as one pollen grain. The column marked "poorly preserved" represents pollen with morphological features too obscure for positive identification. These pollen grains were included in the 200 grain count.

Analysis of the Data

Surface

The two surface samples submitted were designated PS 45 and PS 44 and were taken from the hillside just above and to the north of the site, and from a flat weedy area south of the site. The hillside vegetation consists primarily of Pinus with very small amounts of Quercus, Juniperus, and Yucca, whereas the flatter area surrounding the site supports Quercus, Artemisia, and numerous weeds. Cultivated bean fields are in evidence on the south side of Highway 147, which is approximately 200 to 300 meters south of the site.

The extant vegetation on the hillside is composed mainly of Pinus, as is reflected in pollen sample from that area. The sample contains 68.5% Pinus pollen, and clearly dominates the pollen record of the modern environment on the hillside. The small amount of Juniperus observed growing on the slope was reflected by a level of 1.5% in the pollen diagram, and Quercus was represented by 4% of the total pollen (Fig. 1). Pinus, Quercus, and Juniperus total 75% of all pollen in this sample. The understory growth on the hillside is represented by very low frequencies of non-arboreal pollen, approximately 1-2% for each type, in most cases. The Compositae family, including Ambrosia and Artemisia, probably account for most of the understory growth, and account for about 11% of the total pollen rain. The presence of some of the non-arboreal pollen is probably a result of wind transport from the nearby flat weedy area. Pinus and other arboreal vegetative types dominate the modern vegetation and this is clearly reflected in the pollen sample.

Pollen sample 44 from the flat weedy area near the site contains much more non-arboreal pollen than does the sample from

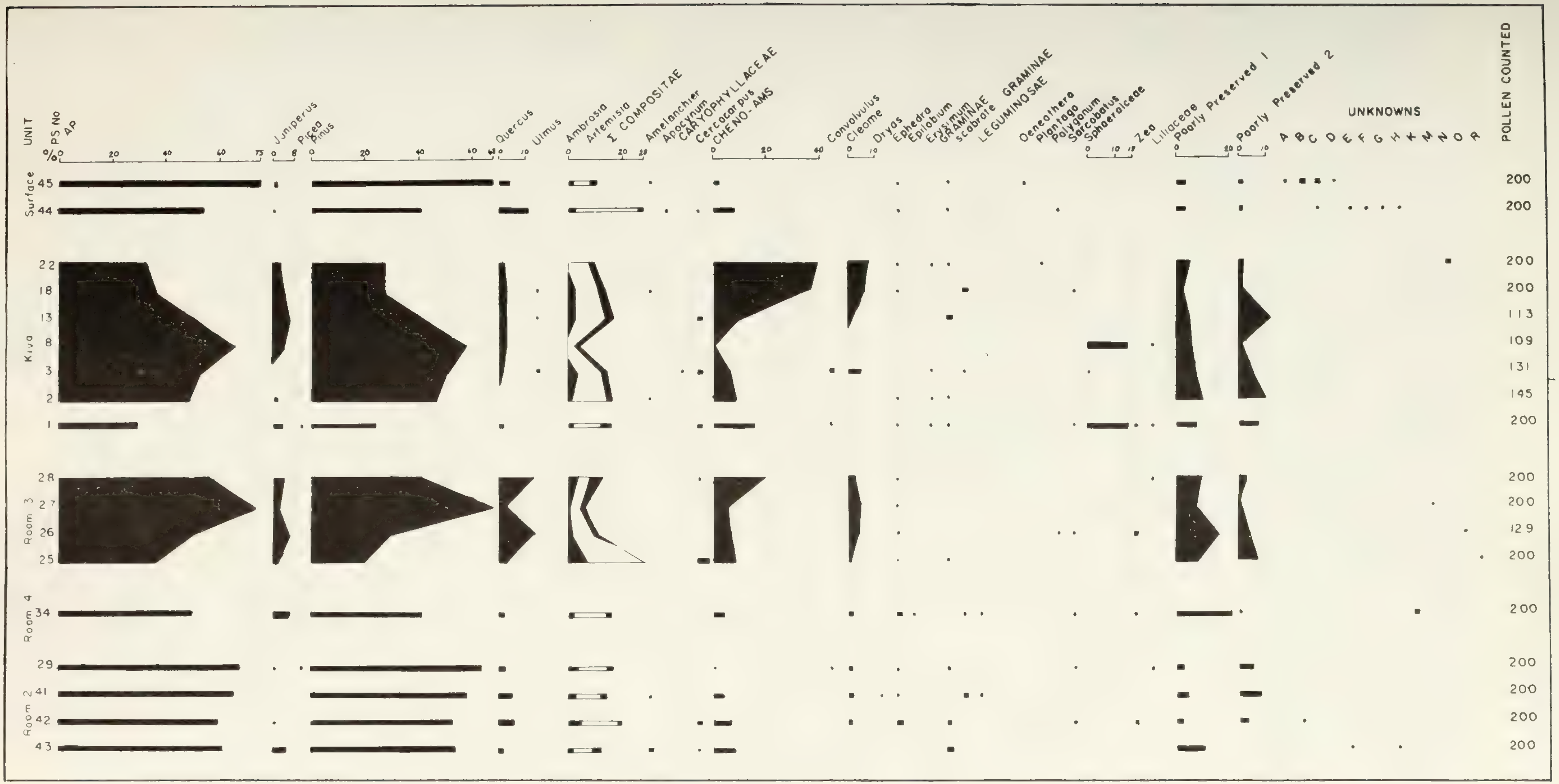

Fig. 1. Pollen diagram for Dominguez Ruin, 5MT2148.

the hillside. It is, however, also dominated by Pinus pollen (41%), which in this case represents a short distance wind transport of the Pinus pollen from the hillside. Although the difference in Pinus percentages is almost 30% between the hillside and weedy area samples, Pinus still contributes heavily to the pollen rain in PS 44. Pinus is a very prolific pollen producer and is frequently transported by the wind (Faegri and Iversen 1964:37-38). These properties of Pinus pollen explain its presence in relatively high frequencies in all the samples from this site, even though Pinus may not have been growing immediately on the weedy area.

Quercus, which grew on the area sampled in PS 44, increases to 11% in this sample, as compared to PS 45, indicating its immediate presence. The major non-arboreal pollen species represented in PS 44 are Artemisia (23%) followed by the cheno-ams with 7.5% of the pollen. Artemisia and cheno-ams were both observed growing in the vicinity sampled, and this is indicated by the higher percentages of these pollen types. The remaining non-arboreal pollen are present in extremely small quantities, indicating that they probably play a relatively minor role in the environment sampled.

The surface samples seem to correlate reasonably well with the vegetation as observed in the general area of the site. A full botanical identification has not yet been completed on the plants in the area, so it is impossible, at this time, to make a plant by plant comparison. There were several types of pollen, generally each representing less than 2% of the total pollen present, which could not be identified at this time, but were well preserved and are described in Table 2. Table 3 provides both the common and scientific names of all plants and pollen types discussed in this paper.

TABLE 2

DESCRIPTION OF "UNKNOWN" POLLEN GRAINS

Unknown	Description
A	Tricolpate, scabrate, approximately 40 microns.
B	Possibly periporate, clavate, approximately 28-30 microns.
C	Tricolpate, scabrate, approximately 23 microns.
D	Stephanocolpate, reticulate, approximately 25 microns.
E	Tricolporate, scabrate, approximately 25 microns.
F	Discoid, convoluted, large indentation in center, approximately 25-35 microns.
G	Inaperturate, verrucate, approximately 45-50 microns.
H	Tricolpate, verrucate, approximately 20 microns.
K	Tricolporate, scabrate, approximately 32 microns.
M	Periporate, tectum in per-reticulate design, similar to Tribulus, spaces between tectum appear to protruce, approximately 45-50 microns. cf. Phlox
N	Tricolporate, smooth, exine thick, especially in polar view, approximately 25 microns, 15 microns polar.
O	Pericolpate, psilate, approximately 35-40 microns.
R	Inaperturate, rugulate, approximately 35 microns.

TABLE 3

POLLEN TYPES FOUND AT DOMINGUEZ

Scientific Name	Common Name
ARBOREAL POLLEN	
Juniperus	Juniper
Picea	Spruce
Pinus	Pine
Quercus	Oak
Ulmus	Elm
NON-ARBOREAL POLLEN	
Ambrosia	Ragweed
Artemisia	Sagebrush
Compositae	Composite family
Amelanchier	Serviceberry
Apocynum	Indian Hemp
Caryophyllaceae	Pink family
Cercocarpus	Mountain Mahogany
Cheno-Ams	Chenopod and Amaranth families
Convolvulus	Bindweed
Cleome	Beeweed
Dryas	Mountain Avens
Ephedra	Mormon tea
Epilobium	Fireweed
Erysimum	Treacle-mustard
Graminae	Grass family
Leguminosae	Pea family
Liliaceae	Lily family
Calochortus	Mariposa lily, Sego lily
Oenothera	Evening primrose
Plantago	Buckhorn
Polygonum	Smartweed
Sarcobatus	Greasewood
Sphaeralcea	Globe Mallow
Zea	Maize, corn

Kiva

The kiva was sampled in natural stratigraphic layers as defined during the excavation and one pollen sample was analyzed from each layer, totaling six pollen samples. The lower four levels of the kiva, PS 2, 3, 8, and 13, did not contain sufficient pollen for a standard 200-grain count. It was hoped, however, that some information could be gathered from a partial count, so the slides of these levels of the kiva were counted in their entirety, producing between 109 and 145 pollen grains, as indicated on the pollen diagram.

Pollen samples 2 and 3 from 3.82 meters below datum (mbd) and 3.75 mbd are representative of the period of occupation at the site and represent the floor and floor fill respectively. The arboreal pollen frequency is very similar in these two samples and in both cases is clearly dominated by *Pinus*. Pollen sample 2 contains 47% *Pinus*, while PS 3 yields 51% *Pinus*. The non-arboreal pollen percentages are fairly similar and constant between the two samples with a few exceptions. The area showing the greatest difference is in the percentage of *Cleome*, which occurs in greater frequency in PS 3.

Cleome is noted as an important food plant for the Hopi and Tewa (Whiting 1939:77; Robbins *et al*. 1916:58-59). Its uses are many and varied including as a spring green, use of the seeds, and boiling and drying of the plant for later reconstitution as either a food or a paint for pottery. Weir (1976:44) has included *Cleome* under the heading "Possible Economic Plant Pollen" in his work at Hovenweep National Monument. *Cleome* is noted by Litzinger (1975: 120) to have been observed in the past at Hovenweep, but was not observed in his study. Welsh and Erdman (1964:12) however, note the occurrence of *Cleome* at Mesa Verde National Park. The *Cleome* pollen does not occur regularly in large quantities

during the period of occupation of this site, and in fact, increases during the post-occupational period, so the likelihood of this plant having been used economically at this site is very slight from the pollen evidence.

While discussing the pollen samples from the occupational period of the kiva, PS 1 representing the contents of a McElmo canteen found on the floor of the kiva near the firepit should also be mentioned. This sample contains much less arboreal pollen, particularly Pinus, than do the floor samples of the kiva. The Compositae, however, are very similar in frequency to the floor samples, as are most of the rest of the non-arboreal pollen. Most of these pollen types may be referred to as "background pollen" when discussing the pollen record from the pot, since they are indicative of the general pollen rain of the period, rather than being specific indicators of the probable contents of the vessel. Two types of "economic" pollen, or in this instance, "ethnobotanic" pollen were found in this sample. Ethnobotanic is the term preferred since it allows a more liberal interpretation and includes both medicinal and ceremonial usage, as well as the traditional connotations of the word economic (Bohrer 1966 in Schoenwetter 1970:38). Sphaeralcea pollen was observed in large amounts (15%) in this sample, but was noted in the other kiva samples. It was also noted that there were several clumps of Sphaeralcea pollen from this sample, indicating the probability that entire flowers or anthers were present in the pot. Whiting (1939:85) states that the root of Sphaeralcea was chewed or boiled for broken bones because of the "gristle" in it. The roots were also used as a cure for diarrhea, constipation or when defecation was difficult or accompanied by blood. The roots were chewed along with cactus roots or the two roots were boiled together. This remedy was also used for bowel trouble in babies. There is,

however, no mention of the use of the flowers or the pollen with respect to the Hopi. Winter (1976:374) in citing other indicates that Sphaeralcea was used by the Hopi for treating broken bones and bowel ailments, specifically diarrhea. S. angustifolia was also chewed as a gum. The Tewa used this plant for a face paint and also to treat headaches, snake bites, and infected sores. Weir (1976:44) lists Sphaeralcea among the "Possible Manipulated Plant Pollen" from the Hovenweep area. It is obvious from the concentration of the pollen in this vessel that it was of some importance to the occupants of the site. Sphaeralcea is insect-pollinated, so its occurrence here cannot be attributed to the pollen rain from the area. Its inclusion in the vessel must have been deliberate.

One grain of Zea was also found in the pot, which may be a fortuitous occurrence, or may indicate that Zea was stored in this pot at a previous time. One Liliaceae pollen grain was also observed in this sample. This may be accounted for by accidental inclusion as a part of the background pollen, or it may represent intentional collection of the plant. The pollen noted as Liliaceae probably belongs to the genus Calochortus. Harrington (1967:159-161) indicates that all parts of the plant are edible, although the bulbs are considered a real delicacy and the source of a good food supply.

Pollen sample 8 represents the kiva "roof fall" from 3.15 mbd and is indicated by a lense of charcoal and burned earth. This sample may be a mixture of occupational and post-occupational pollen deposition. The arboreal pollen from this level represents 65% of the pollen, including 58% Pinus, 4.5% Juniperus, and 2.75% Quercus. The mixture of pollen is indicative of an environment similar to that of today, with a heavy concentration of arboreal pollen, as in the hillside surface sample. Sphaeralcea also occurs at this level and is represented by 14.5% of the pollen.

The high percentage of Sphaeralcea pollen may indicate that the rooftop was used as a work area during the occupation of the site, and that Sphaeralcea may have played an important part in the life at Dominguez as a medicine. If this sample also represents some post-occupational depositon of pollen, Sphaeralcea may have also grown on the roof after abandonment. This sample is probably representative of pollen that accumulated on the kiva roof during and after the period of occupation.

The remaining three samples (PS 13, 18, and 22) are representative of the post-occupational period. The arboreal pollen declines through the post-occupational period with a corresponding sharp rise in the cheno-am pollen in the latest two samples. Cleome continues to be a contributor to the pollen record in these post-occupational levels, and increases in frequency through the post-occupation. The remaining non-arboreal pollen are typical of the area, with one possible exception. Three large grains of Graminae were noted in PS 18 and although a positive identification was impossible at this time, they are very similar to an unidentified Graminae grain reported by Martin and Sharrock (1964:176) as a "scabate large grass".

The lack of a rise in arboreal pollen is unusual in post-occupational desposts. The decline in arboreal pollen in the kiva may, however, represent merely a decline in the relative frequency of arboreal pollen to non-arboreal pollen as the cheno-ams and other weeds increased and became the first stage of plant succession at the abandoned site. The very sharp rise in cheno-ams may indicate that the abandoned kiva, as it silted in, provided a shelter habitat for certain cheno-ams and that the depression served to trap large quantities of cheno-am pollen and thus artifically prejudiced the pollen record in favor of that pollen type.

Indeed, the evidence of numerous slumps of cheno-am pollen from these two levels and the absence of such clumps in the lower levels of the kiva lends credence to this supposition. Samples 18 and particularly 22 also contained substantially more pollen than did the lower levels allowing a full count of 200 pollen grains. This increase in pollen may be a side-effect of the pollen concentrating in the kiva depression and certainly does not run counter to the idea that the chen-ams were suddenly contributing "more than their share" of pollen to the pollen record. This post-occupational sequence does not correlate with pollen diagrams from other Mesa Verde area sites where the post-occupational period is represented, and probably is not representative of the occupation to post-occupation sequence at this site. For an indication of the environmental fluctuations accompanying abandonment and marking the post-occupational period, we will have to rely exclusively on the stratigraphic column from room 3, which exhibits a more typical post-occupationl trend.

Rooms

Four pollen samples (PS 25, 26, 27, and 28) were taken from the natural stratigraphic layers of room 3. The pollen in PS 25, the floor sample, was not well preserved and provided special problems in counting. Many of the grains were in too poor a condition to allow positive identification. The data presented in the pollen diagram were arrived at after several attempts to count the slide, so some identifications are tenuous, at best. Sample 26, the floor fill, also provided a special problem in that it yielded only 129 pollen grains, even though the preparation was concentrated on one slide and it was counted in its entirety.

The stratigraphic column from room 3, when viewed as an occupation to post-occupation sequence, follows a more typical

pattern than did the stratigraphic column from the kiva. The floor and floor fill samples (PS 25 and 26 respectively) have relatively low frequencies of arboreal pollen (37% and 50%), which rise suddenly in PS 27 to a peak of 73%, then taper off to 56% in PS 28. Fluctuations in the Pinus pollen are largely responsible for this change. Since the beginning of the post-occupational period occurs between PS 27 and 28, this rise in arboreal pollen seems to indicate a reforestation of the area following abandonment. This phenomenon was first observed by Martin and Byers on Wetherill Mesa (1965) and since then has also been described by Wycoff (1977) and Scott (1976) in studies in the Mesa Verde culture area. The cheno-ams remain constant during the early portion of the post-occupation, which is consistent with patterns exhibited in other occupation to post-occupation sequences in the area. They do show a rise in PS 28, however, which is approximately 15 cm. below the present ground surface.

Room 4 is represented by a single sample taken on the floor. This sample (PS 34) contains approximately 50% arboreal pollen, mostly Pinus, and is generally similar to other occupational period samples. There are, however, few cheno-ams in this sample and the remaining non-arboreal pollen are also represented by low percentages. The unidentifiable grains from this level are particularly high and represent an abundance of folded, mutilated, and otherwise obscurred pollen, which were impossible to positively identify. This sample will be further discussed in relation to the other floor samples.

Room 2 is represented by four pollen samples from specific features, rather than stratigraphic layers. PS 29 was taken from the floor surface, PS 41 from the interior of a large McElmo bowl found associated with Burial 1 (an infant), PS 42 represents the interior of a McElmo pitcher associated with Burial 2, and PS 43

was taken from the rib cage area of Burial 2. Burial 2 was a high status burial with associated pots, jewelry, and turquoise and brown stone beads. The beads were observed in the pollen sample when it was readied for chemical preparation. All four pollen samples from room 2 show a basic similarity to one another. The arboreal pollen percentages are similar, as are the Compositae. The remaining non-arboreal pollen show some variation, but in each case only very small amounts of pollen are involved. The pots associated with burials 1 and 2 do not vary substantially from the pollen in the floor and burial samples. The pollen contained in the pots indicates that they silted in or were filled with dirt from the surrounding area of the floor. This pollen is referred to as "background pollen" since it mirrors the pollen record as indicated by the surrounding fill. The pot associated with the high status burial (PS 42) did, however, yield 1.5% *Zea* pollen. This is in contrast to the background pollen, since *Zea* was not in evidence in either the floor or burial samples and as such cannot be accounted for by siltation into the pot. Its presence in the pot probably relates to ceremonial use of the pot in the burial, or possibly the pollen remained in the pot after prior use as a utility vessel.

Floors

For purposes of comparison, both floor and floor fill samples will be discussed together, as both categories represent the period of occupation. From the kiva, PS 2 and 3 represent the floor and floor fill respectively. In room 3 the floor and floor fill samples are numbered PS 25 and PS 26. The floor of room 4 is represented by PS 34, while the floor of room 2 is designated PS 29. The samples from rooms 3 and 4 contain the least arboreal pollen and are very similar in most categories of pollen. The

samples from room 2 and the kiva are very similar to each other with respect to arboreal pollen frequency and most non-arboreal pollen, with the exception of the cheno-ams. Room 2 shows very little evidence of cheno-ams in the floor sample, although they are better represented by the features sampled from that room. There are also many similarities between the room 4 and kiva floors, including most arboreal pollen, as well as non-arboreal pollen. Similarities between the various floor samples within the site would seem to indicate a fairly constant environment and/or a relatively short period of occupation.

Identification of room function through pollen analysis was attempted at this site, but the only economic pollen observed in the floor samples was Zea, which occurred in very small quantities. Room 4 (PS 34) contained 0.5% Zea in the floor sample and room 3 (PS 34) contained 1.5% Zea in the floor fill sample. Both rooms were noted archaeologically to contain mano fragments and room 3 also contained 2 metates. The combination of archaeological evidence of manos and metates and palynological evidence of corn in these rooms strongly suggests their use as food preparation areas. The floor sample from room 2 did not contain any economic pollen, even though mano fragments were reported from that room. Palynologically no confirmation of room function can be suggested from room 2.

Adhesive Sample

The adhesive is from one of the pieces of turquoise jewelry. The purpose of examining the sample was to define the source of the adhesive by identifying the potential inclusion of pollen. The preparation yielded only 1 grain of Pinus and one Pinus bladder, so no determination of possible source was made.

Summary and Conclusions

The purposes of this study were to (1) obtain general environmental data from the stratigraphic columns and living surfaces, (2) define occupational and post-occupational deposits, (3) determine room function in rooms 2, 3, and 4, (4) analyze various features to determine the presence or absence of "economic" or "ethnobotanic" pollen, and (5) analyze an adhesive sample to determine its origin, if pertinent pollen was present. Analysis of the nineteen samples submitted produced pollen in all cases, although in the adhesive sample only one and one-half grains were present and they were non-diagnostic. A desired count of 200 pollen grains was not obtained from all samples, but when partial counts were necessitated, they yielded over 100 grains in every case.

Two stratigraphic columns were sampled at the site; one in the kiva and one in room 3. Both ranged in time from the period of occupation through a long post-occupational period almost to the present. Although the columns do not yield similar pollen sequences reflecting environmental changes, the problem seems to lie mainly with the post-occupational period of the kiva. After abandonment the kiva depression apparently provided a sheltered haven for the cheno-ams. There does appear to be some deposition of the general pollen rain at the same time, although it is overshadowed by the large percentages of cheno-ams (36-38%) in the later post-occupational period. Clumps of cheno-am pollen were frequently encountered while counting the upper two levels, indicating that massive amounts of cheno-am pollen were being deposited directly from the plants onto the soil below. It was judged prudent to ignore the results of the analysis of the post-occupational period of the kiva and concentrate on the occupational

to post-occupational sequence provided by room 3. This stratigraphic column exhibited a consideреable rise in arboreal pollen percents between the occupation and post-occupational periods, indicating a probable reforestation of the area similar to that recorded on Wetherill Mesa following abondonment (Martin and Byers 1965).

The general percentages of arboreal pollen, Compositae, and cheno-ams are very similar between the period of occupation and the surface sample from the flat weedy area. There is no evidence to indicate that the general environment was much different than it is today.

Cleome has been identified in the Hovenweep area as an economic plant. Its occurrence in the occupation samples at the Dominguez Ruin, however, is limited, but it rises in frequency in the post-occupational period. The pattern of occurrence of this pollen at the site does not definitively suggest an economic use for the plant. Its rise in the post-occupational levels may be attributed to its invading of waste spaces, or formerly cultivated areas.

Floor samples from rooms 2, 3, and 4 were examined to determine if room function could be assigned. Rooms 3 and 4 yielded a very small amount of Zea, which when combined with the archaeological notation of the presence of mano and metate fragments would indicate that these rooms may have been used for food preparation. The room 2 sample did not contain ethnobotanic pollen of any kind, so no determination of room use may be suggested from the pollen evidence.

Four features were sampled in hopes that ethnobotanic pollen would give some indication of the function of the vessel, or of inclusion of ceremonial plants or pollen. The McElmo canteen from the kiva floor yielded large amounts of Sphaeralcea

pollen, including clumps of Sphaeralcea, which were counted as only one grain each. This pollen may be classified as "ethnobotanic" since it is documented as a medicinal plant used by the Hopi (Whiting 1939) and has been observed as a cultivated or manipulated plant at Hovenweep (Weir 1976). The McElmo bowl associated with the infant burial (Burial 1) did not contain any ethnobotanic pollen grains. The McElmo pitcher associated with Burial 2, the high status burial, yielded 1.5% Zea pollen. It is not clear whether this pollen is present due to a ceremonial function or whether it indicates prior use of the vessel. The sample from the rib cage of Burial 2 yielded no ethnobotanic pollen. The background pollen from the various features was similar to that observed in the floor samples. Pollen was found in all features sampled, but only the Burial 2 vessel and the vessel from the kiva contained any economic or ethnobotanic pollen.

The analysis of the pollen samples from the Dominguez Ruin has shown a basic similarity of the pollen record from the period of occupation to the present. The changes in arboreal pollen frequencies appear to be largely attributable to the abandonment of the site and withdrawal of man's impact on the area, allowing a reforestation to occur. This is reasonably consistent with the pattern of reforestation accompanying abandonment as seen in other recent studies of the Mesa Verse area. The ethnobotanic pollen was observed at this site includes Zea and Sphaeralcea, which are documented in other studies of the area. Zea is by far the most commonly found "economic indicator" in studies of the Anasazi culture. At this site the presence of Zea pollen is indicative of agricultural practices. Ethnographic analogies may be drawn between the reported medicinal use of Sphaeralcea by the Hopi and the presumed similar use of this plant by the inhabitants of the Dominguez Ruin.

The overall results obtained in this study are basically consistent, except for some local variation, with the patterns emerging as typical of the pollen record throughout the Mesa Verde culture area. The environment at the time of occupation was apparently basically the same as that of today. The rise in aboreal pollen probably indicates a reforestation after abandonment rather than a climatic change.

APPENDIX B

SOIL SAMPLE ANALYSIS OF 5MT2148: DOMINGUEZ RUIN, DOLORES, COLORADO.

by

Meredith H. Matthews
University of Colorado

Introduction

Twenty-six soil samples were collected from site 5MT2148 during the excavation conducted the summer of 1976. Analysis of the botanical materials recovered from these soil samples was undertaken to investigate the economic plants used by the prehistoric occupants of the site. Of special interest was the recovery and analysis of botanical remains from soil samples associated with fire hearths and food processing areas. Plant remains recovered from such areas allow a more definite indication of their economic usefulness than plant remains recovered from the soil from more generalized areas of the sites. A rough comparison of wild economic plant remains with cultivated plant remains, per given sample, was attempted during the analysis.

Site 5MT2148, Dominguez Ruin, is located approximately two miles west of Dolores, Colorado on Highway 50. Excavation of the site in July and August, 1976, was directed by Dr. David A. Breternitz of the Mesa Verde Research Center. Alan D. Reed supervised the excavation in the field. The excavation uncovered a four-room pueblo with an associated dirt line kiva (see Figure 2). The site has since been dated to A. D. 1123, the McElmo Phase (Reed, personal communication).

The vegetation at Dominguez Ruin is presently characteristic of the Upper Sonoran, dominated by shrub-grass type growth. Vegetation observed in the area included Quercus, Pinus, Juniperus, Artemisia, Yucca, Chenopodium, Amaranthus, and species of the Compositae and Graminae families. The climate of this area is typical of southwestern Colorado, hot and dry. The seasonal distribution of rainfall belongs to the summer-dominant pattern.

Methodology

Sampling

The soil samples were collected from each room and from Kiva A. Two fire hearths, associated with Room 1 and Kiva A, were also sampled. Samples were collected from the area associated with three burials uncovered in Room 2. One of these burials was a high status burial with jet, turquoise, and shell jewelry, and associated funeral pottery. Samples were collected here to test for potential grave goods, i.e., special wild plant foods interred with the bodies. Samples were collected also from special artifact features, e.g., a pot and bowl from Room 2, a pot from Room 1, and a corrugated pot from the floor of Kiva A. Samples were recovered from soil layers above and below the floor levels of the rooms. Two samples, collected from Room 3 and the upper fill of Kiva A, represent post-occupational plant material, a fact which should help elucidate the changes that occurred in the plant community after Dominguez Ruin was abandoned.

Water Separation

The technique of water separation was used to recover the botanical material from each soil sample. The best flotation method for this study was one almost identical to that described by Streuver (1968) for indoor water flotation, since only a small quantity of soil, a liter or less, was to be processed per sample. In addition, all flotation procedures took place after the field season, and this method allowed the most flexibility for the space and equipment available.

The method of water separation is based on the principal that different substances have different porosities and specific gravities (Streuver 1968:353). When added to water, organic materials will

float on or slightly below the surface, while inorganic matter will settle to the bottom. The organic matter then can be collected from the surface of the water for analysis.

Since comparative statistical studies are not a focus of this analysis, samples were recorded by volume instead of by weight. Ideally, samples were to have been collected in 1.5 liter quantities. However, this was not always feasible since some features did not contain enough soil. Since a set amount of 1.5 liters was establshed for quantitative consistency, a certain degree of control has been lost due to the inconsistency of the total amount of soil floated. However, for the purpose of this study, it is believed this inconsistency did not skew the results.

When a sample contained 1.5 liters of soil, one liter of this was floated out, setting aside the remaining half liter. For samples containing less than 1 liter but more than 375 milliliters of soil, all but one third of the soil was floated. Any sample containing less than 375 milliliters of soil was completely floated out. Whenever possible, one third of the soil was retained in case of damage to the majority of the sample or later studies.

All samples to be floated were measured for total volume, recorded and remeasured for the amount to be floated. Each portion of a sample to be floated was dry-scanned to retrieve any large observable material, e.g., bone or large seeds. The soil was then slowly poured into a bucket of water that was being stirred in one direction to create a centrifugal force. All matter on or near the water's surface was skimmed off with an ordinary tea strainer that had been covered with copper mesh 1/80 inch. This organic matter was then transferred to drying pans. This procedure of alternately rotating the water and skimming off the lighter fraction was continued until all material on or near

TABLE I

PROVENIENCE OF SOIL SAMPLES

Soil Sample Number	Provenience
1	Room 1 - taken from pot within the room; .95 mbd
2	Kiva A - taken from pot in kiva; test square p-12; 3.67-3.97 mbd
3	Room 2 - gray clay lense; 1.1 mbd
4	Kiva A - lower kiva fill; 3.50 mbd
5	Kiva A - lower kiva fill - roof burn fall; 3.15 mbd
6	Kiva A - upper kiva fill; 2.15 mbd
7	Room 3 - floor fill; 1.0-1.15 mbd
8	Room 3 - roof fall; .4-.8 mbd
9	Room 2 - floor fill
10	Room 4 - floor fill; 1 mbd
11	Room 4 - below humus; .70 mbd
12	Room 1 - Feature 7 - fire hearth fill; 1.9-1.24 mbd
13	Room 3 - sub-floor trench; 1.45 mbd
14	Room 3 - sub-floor trench; 1.55 mbd
15	Room 3 - sub-floor trench; gravel lense; 1.65 mbd
16	Room 2 - Burial 1, infant burial; 1.55 mbd
17	Room 2 - Burial 2, high status burial, right illiac crest; 1.80 mbd
18	Room 2 - Burial 2, FS 242 Chaco pot; 2.50 mbd
19	Room 2 - Burial 2; FS 243 bowl; 1.60 mbd
20	Room 2 - Burial 2; 1.55 mbd
21A	Room 2 - Burial 2; organic material; 1.66 mbd
22A	Room 2 - Burial 3; adolescent burial; rib cage, pelvis
22B	Room 2 - Burial 3
23	Room 2 - Burial 3; contents of rib cage; 1.50 mbd
24	Kiva A - sample from fire hearth

the surface had been removed.

After all material had been cleared with the strainer, the bucket of water was poured through three different size screens with mesh of 1/4 in., 1/16 in., and 1/40 in., respectively. Residue caught in each screen was examined for any material, cultural or organic, that should be retained. The floated material was left to air dry, which took approximately two to four days. Although an incubator was available for drying and would have shortened the drying time considerably, it was not used for fear of heat distortion to the seed material. For further discussion on the effects of heat to seeds, one should refer to Stewart and Robinson (1971). Once the material had dried, it was bagged, labeled and ready for microscopic analysis.

Microscopic Analysis

All recovered material was dry-screened through three different mesh screens, each progressively smaller: 1/16 in., 1/40 in., 1/80 in. The purpose of subdividing the sample by size difference of the organic material was to create a more workable unit of matter to deal with at one time. The subparts were then viewed individually under a binocular scope at a power of 10X. All whole seeds, identifiable portions of seeds, plant parts and unusual materials were pulled from the sample and analyzed more thoroughly after the total sample had been viewed.

Highly specific identifaction of botanical material from 5MT2148 was not usually possible. The condition of the material, the limited amount of material recovered and the lack of a herbarium collection for a direct reference hindered specification. In general, identification manuals like Martin and Barkley (1961) were helpful. All identifications made by this analyst were

confirmed by Dr. Robert Bye, ethnobotanist at the University of Colorado, Boulder. Dr. Bye also provided identification of ambiguous specimens.

Results

Table II outlines the botanical remains recovered and analyzed from the 26 soil samples collected at the Dominguez Ruin. The symbols associated with Table II designate the degree of assurance with which each identification was made and a key has been provided to aid in understanding these symbols. All plants have been represented only on the family level of identification in Table II. More specific identification follows in Table III. Botanical remains recovered were scarce per sample and usually poorly preserved.

Initial analysis of botanical material from the Dominguez Ruin showed a high percent of small, black, spherical specimens. These were placed in the grass family. However, during the final stage of analysis the lack of identifying external morphological structures on most, although not all, of these specimens made the initial Gramineae identification questionable. Furthermore, it was not clear whether these specimens were plant material or possibly were insect eggs or droppings. Because grasses are common to disturbed areas and were one of the more common wild plant foods exploited by prehistoric-historic southwest Indians and because several specimens from 5MT2148 have external morphological features, it was thought best to leave these specimens included in Gramineae. They might represent one of the variable forms of a genera of Gramineae that has been affected by some extraneous force of nature. It should be noted that all seed

material excluding Zea mays that was here included in the grass family has been done so on the assumption that later research will clarify this classification.

Another identification problem concerned that of Malvaceae. Although examples of Malvaceae were relatively frequent or at least numerous than other seeds per given sample, erosion to the outer surface precluded positive identification beyond the family level. Except for the genus Malvastrum positively identified from sample 12, Room 2, all other specimens of Malvaceae were similar in shape and probably of the same genus. The pollen analysis by Scott (Appendix A) provided positive identification of Sphaeralcea (Globe Mallow). The pollen samples containing evidence of Sphaeralcea were collected from similar proveniences as samples containing Malvaceae seeds. Scott does not indicate any other genus of Malvaceae in her pollen analysis, which strongly suggests that the recovered Malvaceae specimens from soil samples are of the genus Sphaeralcea. This suggestion is furthered by the present-day growth of Spaeralcea at Dominguez Ruin. However, positive correlations cannot be made due to the poor preservation of the Malvaceae seeds.

Rooms

As can be seen from Table II, eight plant families were represented by seeds recovered from soil samples from the rooms at Dominguez Ruin. These families included Amaranthaceae, Chenopodiaceae, Compositae, Gramineae, Fagaceae, Leguminosea, Loasceae and Malvaceae. Many of the soil samples collected from the rooms contained seed material too poorly preserved to be identified, with any assurance, to even the family level. Table III provides the more specific identification of the seed material recovered from each room.

Kiva A

Seeds analyzed from samples collected on the floor and from the fill of Kiva A were categorized into five families. As Table II shows, these families are Maranthaceae, Chenopodiaceae, Gramineae, Malvaceae and Portulacaceae. The Portulacaceae seeds recovered from the kiva were the only evidence of this plant from soil collections made at 5MT2148. This lack of Portulacaceae is interesting because the plant is quite common to the area, has been documented ethnographically as a utilized economic plant and has been recovered from other prehistoric Southwestern sites (Jones and Fonner 1954). As previously mentioned the Malvaceae seeds could not be identified beyond the family level. However, provenience correlation with pollen samples suggest that these seeds might be the genus Sphaerlacea

Disussion

Ethnobotanical Information

In dealing with prehistoric plant remains, it is helpful to refer to the present day utilization of the plant to conjecture its prehistoric use. All plants recovered and analyzed from the soil samples have been documented as wild economic plants used at one time or presently by Southwest Indians. With the exception of soil samples 3, 6, 8, 11, 13, 14, and 15, all samples had cultural significance, collected from either floor fill, roof fall, pottery or soil surrounding the three burials.

Specimens of Amaranthaceae from 5MT2148 include *Amaranthus blitoides* and *A. retroflexus*. Both are common to disturbed areas and bloom June through August, with the seeds ripening from July to October. *Amaranthus* or pigweed is a common food source among the Hopi,

Table II illustrates the occurrence of seeds, by family within each soil sample. Although positive identification below the family level was possible in some cases, it is not noted in this table.

Based on Bohrer and Adam's "Guide to Learning Prehistoric Seed Remains from Salmon Ruin, New Mexico" the following symbols designate:

*	positive identification on whatever level, family or more specific, that could be confidently established.
t	type. This symbol is a qualifying term to designate almost positive identification. However, similar genuses or species of the genus in the area have not been examined, thus positive identification is lacking.
cf	doubtful identification

TABLE II

RESULTS OF SEED ANALYSIS
DOMINGUEZ RUIN

Soil Sample and Provenience	Evidence of Plant Family	Amaranthaceae	Chenopodiaceae	Compositae	Fagaceae	Gramineae	Leguminosae	Loasceae	Malvaceae	Portulacaceae	Unidentified Material	Total # of Families per sample
SS 1-Rm 1						cf						1
2-Kiva A									*			1
3-Rm 2												0
4-Kiva A		t*	*			cf					*	4
5-Kiva A						cf			*		*	3
6-Kiva A			*			cf			*		*	4
7-Rm 3		*	*		*	cf	*				*	6
8-Rm 3			*	*	*	cf			*		*	6
9-Rm 2			*			cf						2
10-Rm 4						cf						1
11-Rm 4		t	*			cf					*	4
12-Rm 1		*	*			cf*			*		*	5
13-Rm 3						cf						1
14-Rm 3						cf						1
15-Rm 3						cf					*	2
16-Rm 2			*	*		cf					*	4
17-Rm 2						cf						1
18-Rm 2			*			cf						2
19-Rm 2						cf		*			*	3
20-Rm 2												0
21A-Rm 2						cf						1
21B-Rm 2						cf						1
22A-Rm 2			*			cf						2
22B-Rm 2						cf					*	2
23-Rm 2						cf					*	2
24-Kiva A		*	*			cf			*	*	*	5
Total occurrence of family for all samples		5	11	2	2	23	1	1	6	1		

TABLE III

ECONOMIC PLANTS RECOVERED FROM DOMINGUEZ RUIN

A. Room 1
   1. Amaranthaceae
      Amaranthus sp.
   2. Chenopodiaceae
      Chenopodium sp.
   3. Graminae
      Zea mays
   4. Malvaceae
      Malvastrum sp.
   5. Unidentifiable material
      Anther sacs from two unidentified species of trees

B. Room 2
   1. Chenopodiaceae
      Chenopodium sp.
   2. Compositae
      Helianthus sp.
   3. Graminae
   4. Loasceae
      Mentzelia sp.
   5. Unidentifiable material

C. Room 3
   1. Amaranthaceae
      Amaranthus blitoides S. Wats (*A. graecizans* L.)
   2. Chenopodiaceae
      Chenopodium album L.
      Chenopodium s;.
      Atriplex sp.
   3. Compositae
      Helianthus sp.
   4. Fagaceae
      Quercus sp.
   5. Graminae
   6. Leguminosae
   7. Malvaceae
   8. Unidentifiable material
      Possible Rubiaceae or *Mentha*, aroboreal parts

D. Room 4
   1. Amaranthaceae
      Amaranthus sp.
   2. Chenopodiaceae
      Chenopodium sp.
   3. Graminae
   4. Unidentifiable material
      Anther sacs from unidentified genus of tree

TABLE III (Continued)

ECONOMIC PLANTS RECOVERED FROM DOMINGUEZ RUIN

E. Kiva A.
   1. Amaranthaceae
      Amaranthus sp.
      A. blitoides S. Wats
      A. Retroflexus L.
   2. Chenopodiaceae
      Chenopodium sp.
   3. Graminae
   4. Malvaceae
   5. Portulacaeae
      Portulaca sp.

Pima, Papago, Zuni, and Navajo (Whiting 1939; Winter 1976; Elmore 1944). The seeds of Amaranthus occur in compact heads of the plant when ripe and can easily be collected in quantity. The usual processing method used by the Indians is to parch and then grind the seeds into a meal, which is made into breads or mush. The greens of this plant have been documented as collected and prepared like spinach. Both the Hopi and Zuni have cultivated A. cruentus as a dye plant and there is documentation of the domesticated grain amaranth, A. leucocarpus occurring as a cultigen among the Zuni and Arizona Indians (Winter 1976:372). As Bohrer demonstrated (1962) in her analysis of seed material from Tonto National Monument, A. leucocarpus was also a cultigen of prehistoric peoples.

Chenopodiaceae, represented at Dominguez Ruin by Chenopodium sp. and Atriplex, is one of the more frequently documented wild plant families utilized by Southwest Indians. Atriplex sp. is common to sage zones and blooms in June. The Hopi used this shrubby bush more for its wood than the seeds. Not only was it used as fuel, but the ashes were incorporated into certain corn dishes or used like baking soda (Winter 1976:371). The plant has also been used as medicine or as prayer sticks by the Hopi, Zuni, and Jemez (Ibid.). Chenopodium or lambsquarter is also common to sage and pinyon-juniper zones. Like amaranth, both the greens and seeds of chenopod have been documented food sources (Winter 1939; Elmore 1944; Whiting 1939). The greens were gathered from June through August and prepared like spinach. Chenopodium plants produce copious numbers of seeds which are collected August to late September or October (Minnis and Ford 1977). These seeds are dried, ground and treated much the same way as corn. Among the Navajo specifically the ground meal is used for tortillas or bread (Elmore 1944:44). The meal is often made into a mush type dish also.

Helianthus sp. (Compositae) is known commonly as sunflower. The fruits of this plant are popular at present among a wide cross-section of the American public. The Hopi used different species of Helianthus for a dye, body paint, construction purposes and food (Whiting 1939). The Zuni, on the other hand, use it only for rattlesnake medicine (Winter 1976:372).

The genuses included in the grass (Gramineae) family are numerous. As previously discussed the material in Gramineae, except for the specimen of Zea mays, is not identifiable at present. However grasses have played an important part in Indian diets as a wild plant food. Grasses are common to disturbed areas and relatively hardy plants. For the most part, the seeds were the plant part sought, these being parched, ground, or stored and used like any other grain plant.

Before excavation of 5MT2148, Quercus gambelii covered the site. The genus Quercus is part of the Fagaceae family (Beech) and common to the area surrounding Dominguez Ruin. Evidence of this shrub-tree from soil samples came from floor fill or roof fall-humus, the latter being too contaminated with modern material to be considered in a cultural context. The most feasible use of Quercus is as fuel or as construction material with the acorns edible when leached to remove the tannic acid. Since Room 3, where Quercus buds from a sample were recovered, does not contain a fire hearth, it is assumed the remains of Quercus are either cultural debris, left from construction activity or are post-occupational contaminants.

Only one specimen of the wild pea family was recovered and could not be identified beyond that designation. Members of the pea family have been used as medicine, as food, and as ceremonial objects (Whiting 1939). Southwest Indians are documented as using

the stalks, roots, and seeds for a variety of purposes. The one seed found cannot substantiate intentional collection of wild legumes by the prehistoric occupants of Dominguez Ruin. However, it should be noted that the specimen was found in Room 3, which also contained two milling bins, thus indicating the room as a food processing area.

Loasceae, or more specifically Mentzelia (Blazing Star) is a herbaceous pernnial, blooming in June and July (Winter 1976:419). Whiting (1939:21) notes that the Hopi only used Mentzelia in times of food shortage as the food value of the plant is quite low. The seeds were gathered, parched, and ground before being eaten. The seeds appear to have been more important medicinally, commonly used to cure toothaches (Whiting 1939:85). The plant is further documented as a substitute for tobacco.

Four Mentzelia seeds were recovered from the soil of a funeral bowl associated with the high status burial in Room 2. It is not known whether these four seeds are indications of ceremonial-medicinal activities associated with the high status individual or the bowl they were contained in. However, these four seeds represent the total recovery of Mentzelia from the site. Since other soil samples were collected in close provenience to this funeral bowl and did not contain evidence of Mentzelia, it is doubtful that their appearance in the bowl can be attributed to silting from the surrounding fill. It is likely, therefore, that the seeds were placed in this bowl for a culturally significant purpose.

The family Malvaceae includes wild and cultivated cotton plus a variety of mallow genuses. The genus ethnographically documented most is Sphaeralcea, a Globe Mallow, and has been documented as a medicinal plant among the Hopi, Tewa, Navajo, and Zuni (Whiting

1939; Elmore 1944; Winter 1976). Whiting states (1939:85) that the roots of the plant were chewed to treat broken bones or to relieve bowel ailments, especially among babies. Chewing the root seems to be used as a diuretic or antispasmodic, depending upon the ailment. The Tewa used the plant as face paint or as a cure for headache, snake bites and infected sores (Winter 1976:374). Elmore states (1944:63) that S. coccinea was used by the Navajo to stop bleeding or remedy diseases caused by witchcraft. Medicinal use of the seeds alone has not been highly documented.

The identification problem concerning the Malvaceae seeds recovered has already been discussed. Malvaceae seeds were recovered from the firehearth in Room 1, a pot on the kiva floor and from differeent levels of kiva fill, one associated with roof fall. The occurrence of Malvaceae with specialized areas of Dominguez Ruin, a firehearth and ceremonial unit, suggests definite cultural use. However, whether this use was medicinal, ceremonial or a combination is impossible to determine. Although documentation of Malvaceae seeds being used was limited, it stands to reason that the seeds are the most likely part of the plant to be preserved if utilized by the prehistoric occupants. Preservation rate among seeds would not only be higher because of their disuse, but the seed coat would afford some protection. It cannot be determined if the occurrence of Malvaceae in the pot on the kiva floor was intentional or just accidental siltings since the kiva fill itself did contain Malvaceae seeds.

Portulaca or purslane appears to have limited uses among Southwest Indians although it occurs in the same type of environment as amaranth and chenopod and is often found coexisting with the two. Purslane also provides copious members of seeds per plant. The seeds were eaten by the Navajo and used a potherb in

making gravy by the Hopi (Elmore 1944:47; Whiting 1939:75). The only evidence of Portulaca from the site came from the kiva firehearth, which indicates preparation of the seeds for consumption or some other purpose.

Cultigens

There was an obvious lack of cultigens recovered from 5MT2148. The only evidence of domesticated plants was one carbonized kernel of Zea mays recovered from the firehearth of Room 1. The pollen analysis indicates the relatively frequent occurrence of corn pollen within the site, but no evidence of the two other typical Puebloan cultigens, beans and squash. Ethnographically, the two latter cultigens are important food sources among Pueblo Indians, usually cultivated concurrently with maize. Beans are especially important as a source of storable plant protein (Minnis and Ford 1977:10).

The lack of cultigens is puzzling. The agricultural potential of the land surrounding Dominguez Ruin is illustrated by the extenstive farming of the area at present. Other Pueblo sites of comparable age within the same general area show evidence of corn, beans, and squash. Possibly prehistoric preparation and utilization methods have hindered the recovery of cultigens, since this is frequently the case found elsewhere when recovery of especially beans and squash is low (Minnis and Ford 1977:11). Poor preservation or possibly a poor sampling scheme could also have skewed recovery of cultigens. However, all food processing areas were sampled so the latter suggestion is not really feasible. If for some reason collection and preparation took place elsewhere, then there would be limited recovery of cultigens although not total absence. However, there is the possibility that cultivation of beans and squash was not actively pursued at the Dominguez Ruin,

although cultivation of *Zea mays* was.

Food Processing Areas

Two metates were found in association with milling bins in Room 3. One metate was found *in situ*, on the floor of Kiva A, with miscellaneous metate fragments in the kiva fill. Firehearths were uncovered in Room 1 and Kiva A. All of these areas have been designated as food processing areas. Seeds recovered from each area have economic value, mostly for subsistence purposes. As previously noted, the firehearth of Room 1 yielded the only cultigen, *Zea mays*. Both firehearths from Room 1 and Kiva A provided chenopods, amaranths and specimens of Malvaceae, with the occurrence of *Portulaca* limited to the firehearth of Kiva A. Samples taken in association with the metates yielded chenopod, amaranth, grass and the single wild legume. Samples from these areas did not provide large quantities of economic plant material. While all material recovered was of ethnobotanical significance, the corn kernel, the wild legume and the Malvaceae seeds associated with both firehearths were the most noteworthy. The association of Malvaceae with the firehearths implies some economic importance to the occupants of the site and most likely were important as a medicinal plant if the seeds prove to be the genus *Sphaeralcea*. Although wild legumes are edible, the small occurrence of legume at the site cannot really indicate anything since there are extraneous factors that could be responsible for its appearance, without cultural affiliations. The significance of the corn kernel has already been discussed.

Burials

From the ten soil samples analyzed from the burials, only the occurrence of *Mentzelia* was noteworthy. Since *Mentzelia* seeds

were recovered from among the grave goods, it is thought to have some commercial medicinal value associated with the high status burial. All other seeds found are believed to be either from silt in or part of the general debris left by the occupants of Dominguez Ruin.

Post Occupation

Plant remains recovered from soil samples representing post occupation were typical of plants occurring in disturbed areas. These plants included *Chenopodium*, *Gramineae*, *Malvaceae*, arboreal material, most of which was oak, and *Helianthus*. Litzinger notes (1976:420) that the genus *Sphaeralcea coccinea* is frequently found on archaeological ruins in the pinyon-juniper and sage zone. It was noted that there was an increase in chenopods in post occupation soil samples. Population increase of Chenopodium is typical for plant succession in disturbed areas. In general, soil samples of the post occupation period of Dominguez Ruin yield the expected seed and plant material for that area.

Summary

Analysis of the twenty-six soil samples from 5MT2148 has not provided as much information as originally hoped, concerning the economic plants used by the prehistoric occupants of the site. The recovered plant remains were exiguous and often poorly preserved, providing insufficient evidence to connote the subsistence activities pursued at this site. However, all plant remains recovered at 5MT2148 were of economic, ethnobotanical significance. The appearance and provenience of both *Mentzelia* and Malvaceae suggests some ceremonial-medicinal import of both plant types. The recovery from food processing areas was disappointing although

one kernel of Zea mays was recovered. In general, the lack of evidence for cultigens was surprising especially since the site is thought to have been in continuous occupation and in a time period when the Anasazi were intensive agriculturalists (Reed, personal communication). The disproportionate occurrence of cultigens to wild economic plants would at first suggest a gathering type economy. However, the minimal recovery of wild plant foods does not support this either. It is believed that the occupants of 5MT2148 were agriculturalists, but for some reasons, analysis of the soil samples does not substantiate this, although the pollen analysis does lend more evidence for the occurrence and cultivation of Zea mays.

In conclusion, eight families of plants were recovered from the soil samples: Amaranthaceae, Chenopodiaceae, Compositae, Fagaceae, Gramineae, Leguminosae, Loasceae, Malvaceae, and Portulacaceae. All eight are documented ethnographically among Southwest Indians as economic plants. Except for the specimens of Fagaceae, the questionable specimens of Gramineae and the single Leguminosae seed, all other plants are believed to have had subsustence or medicinal significance to the occupants of Dominguez Ruin.

TABLE IV

ECONOMIC PLANTS IDENTIFIED FROM 5MT2148

Common Name	Scientific Name
Pigweed	Amaranthus (Amaranthaceae)
Lambsquarter	Chenopodium (Chenopodiaceae)
Saltbush	Atriplex (Chenopodiaceae)
Sunflower	Helianthus (Compositae)
Oak	Quercus (Fagaceae)
Grass	(Gramineae)
Corn	Zea mays (Gramineae)
Pea, Bean	(Leguminosae)
Blazing Star	Mentzelia (Loasceae)
Mallow	(Malvaceae)
Rose Mallow	Malvastrum (Malvaceae)
Purslane	Portulaca (Portulacaceae)

APPENDIX C

ANALYSIS OF ADHESIVES FROM 5MT2148

by

Alan D. Reed

A sample of adhesive material was taken from one of the two medallion-shaped pendants (Fig. 25) and was submitted to the laboratories at Rockwell International for infrared and emissions spectroscopic analysis. A sample of lac produced from Coursetia glandulosa, collected in Barranca de Batopolis, Chihuahua, Mexico, and a lac sample from Larrea divaricata, collected in Utah or Arizona, were also submitted for comparative purposes.

Tests showed that the archaeological adhesive consisted of 80% to 90% inorganic material. This inorganic material was predominately comprised of an aluminum and silicate substance, thought to be clay. The inorganic constituent of the adhesive, comprising the remaining 10% to 20% of the total, was found to resemble the Larrea divaricata sample.

The Larrea sample has an acid structure, and characteristics of esters and of fatty (mono-) glycerides. It has been broken down to a gum (e.g., carbohydrate polymers, glycosides/acetals, and starches), and has a cellulosic-type infrared spectra. The sample, like the Coursetia sample, is entirely organic.

The Coursetia glandulosa specimen has a high aromatic acid content, similar to benzonic and cinnamic acids. Fatty acids and rosin acids are present. Infrared spectra have an extensive carbonyl character, which is more indicative of natural resins than of gums. The Coursetia lac sample is distinctive from the Larrea and the archaeological sample.

The adhesive in the two medallion-shaped pendants and the frog-effigy pendant were macroscopically identical. When these ornaments were manufactured, the adhesive was probably prepared by means of adding a small amount of water to some clay--enough to make it sufficiently pliable--and then adding lac, possibly obtained from Larrea sp. shrubs. The clay would have acted as a suitable matrix in which to inlay the shell, turquoise, and specular hematite materials, and would have served to stretch the amount of pure lac needed for a proper bond in the construction of the ornaments.

ARCHEOLOGICAL EXCAVATION AT THE ESCALANTE SITE, DOLORES, COLORADO, 1975 AND 1976

by

Judith Ann Hallasi

With Appendices

by

Steven D. Emslie

and

Peter J. Gleichman

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Once or twice a week through the summers James A. Lancaster was present at the site to supervise and consult with the progress of the excavations aiding in the interpretation of the excavations. Special thanks to Curtis W. Martin and L. Kent Leidy who supplied direction as field foremen in the 1975 and 1976 field seasons respectively.

Through the summers many students of the Mesa Verde Research Center worked at the Escalante excavations on a rotational basis. The crew members included Marci Donaldson, Tom Euler, Pete Gleichman, Laura Maness, Todd Metzger, Alan Reed, Betsy Tipps, Wolky Toll,

and Paul Williams in 1975; and Woody Farr, Jerry Fetterman, Marcia Kelly, Laura Maness, Meredith Matthews, Janet Rose, and Betsy Tipps in 1976.

Lab analysis was under the direction of Christine Robinson for the 1975 field season, and Kellie Masterson for the 1976 season. The people performing artifact analysis for the 1975 season include: Tim Weston, worked bone tools; Marci Donaldson, bone identification; Pete Gelichman, lithic analysis; Mark Stiger, plant identification. The people who helped with the analysis of the 1976 season's material included: Todd Metzger, lithic analysis; Steve Emslie, bird bone identification and help with mammal bone identification; Pete Gleichman, soil analysis; and Kellie Masterson, ceramic analysis and help with stone and bone analysis.

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This report is submitted in partial compliance of BLM Contract No. 52500-CT5-1044. Additional work conducted under terms of this contract include reports of stabilization conducted during 1975 and 1976 (White 1976, 1977) and a report of excavations conducted at the Dominguez Ruin (Reed, 1977).

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CHAPTER I

INTRODUCTION

Purpose of Work

The Department of Anthropology of the University of Colorado conducted two seasons of excavation and stabilization during the summers of 1975 and 1976 at the Escalante Ruin, site 5MT2149 (Fig. 1). This project was sponsored by the Bureau of Land Management to be open for public viewing as part of the Escalante Trail, a Bicentennial project tracing the path of the 1776 Dominguez and Escalante Expedition.

This volume includes a report of the archaeological excavations during 1975 and 1976 at the Escalante Ruin submitted in partial compliance of BLM Contract No. 52500-CT5-1044. The partial excavation of the site included excavation of one kiva and seven rooms with testing in the second kiva and along the exterior walls of the ruin. Additional work conducted under terms of this contract include reports of excavation at the Dominguez Site and stablization of the Escalante and Dominguez Sites. The excavations conducted in the 1976 field season at the Dominguez Site, one of the small ruins located below the Escalante Site hill, is presented by Reed (1977). Stabilization was conducted during both the 1975 and 1976 field seasons at the Escalante Site and was conducted at the Dominguez Ruin in the 1976 season. Reports of the stabilization during the two field seasons are presented in separate volumes (White:1975, and this volume).

The excavations at the Escalante Ruin contribute to the prehistory of the region where few excavations have been performed. The site is also important in its relationship with Chaco Canyon in New Mexico, and it adds to the knowledge of Chaco outliers in the Mesa Verde area.

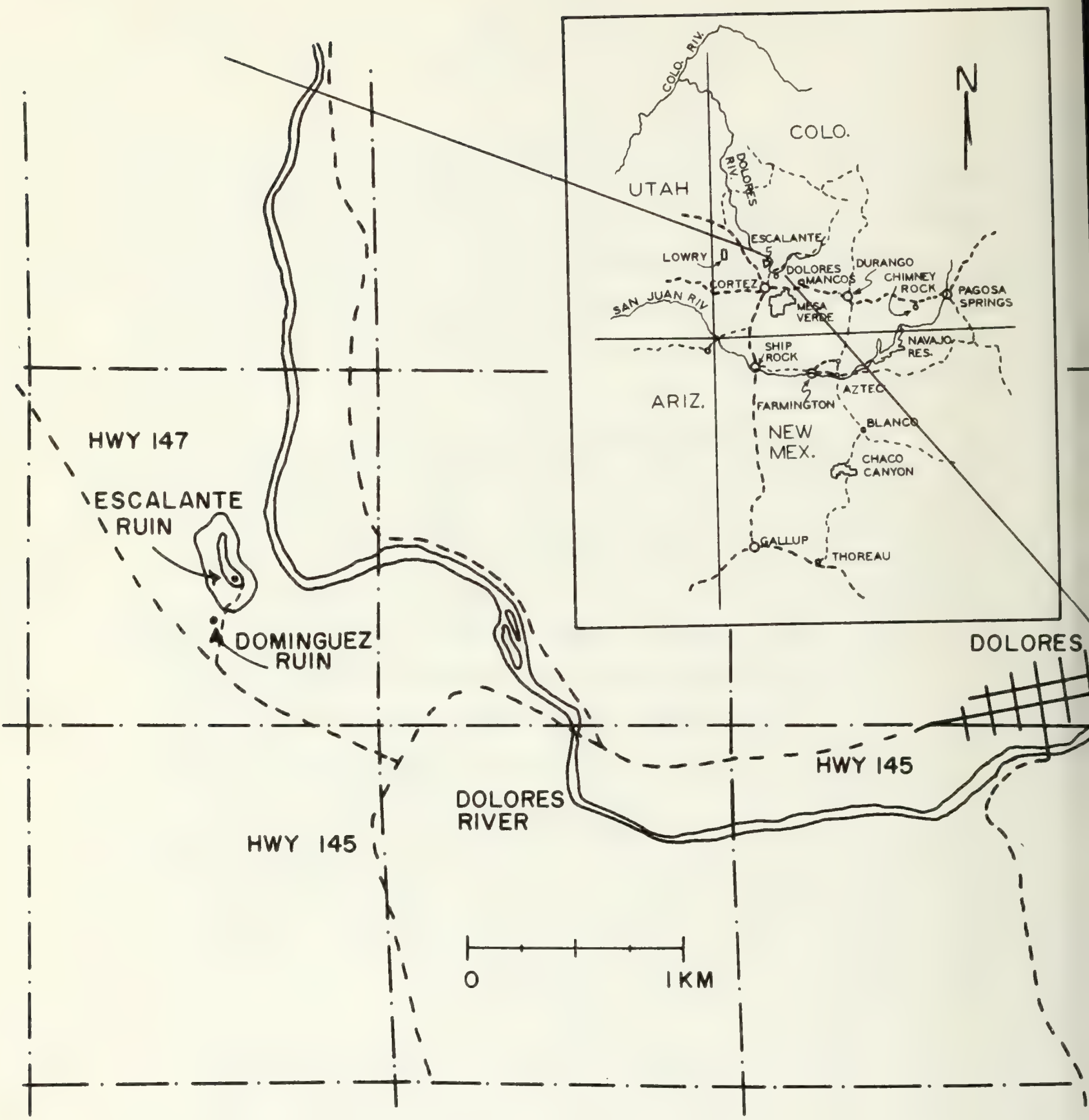


Figure 1. Map showing the location of the Escalante Ruin, site 5MT 2149.

Geology

The southern extension of the La Plata Mountains ends in a long slope about 7500 feet above sea level forming a plateau, the Mesa Verde, which stretches southward to the San Juan River and ends in abrupt, nearly vertical faces, 1200 to 1500 feet in height. Between the mesa and the mountains is a natural pass or "puerta" through which an old Spanish trail as well as an old Indian trail led. This puerta opens onto an extensive area of flat land, one of the largest in the plateau country, which Newberry (1876:83) named the Great Sage Plain. The Great Sage Plain, about 1200 square miles in the area, extends into southeastern Utah, varying from 7000 to 5000 feet in elevation (Gregory 1938:7).

The floor of the Great Sage Plain is a massive resistent stratum 200 to 300 feet thick of Lower Cretaceous Sandstone (Gregory 1938:60) named "Dakota(?) Sandstone." Above the Dakota Sandstone is the Middle Cretaceous Shale known as Mancos Shale, a predominantly blue-gray crumbling, gullied shale displayed in the Mesa Verde walls (Gregory 1938:58). Here the Mancos Shale is 2000 feet in thickness, overlaid by the Upper Cretaceous strata of the great beds of Mesa Verde Sandstone.

Across the plain the Mancos Shale is worn away so that the Dakota Sandstone is exposed. In places it is bare and in places it is covered with thin patches of soil. Scattered over the plain are small mesas and ridges of Mancos Shale that rise 10 to 100 feet above the Dakota Sandstone. Wherever the shales have been entirely eroded, quantities of Gryphaea and oyster shells may be seen washed out from the shale beds on the hard standstone floor (Holmes 1875:259; Newberry 1876:88). Only at the edge of the Great Sage Plain on the Mesa Verde where the protective overlying

Upper Cretaceous Mesa Verde sandstone is present, has the Mancos Shale layer not eroded.

The Great Sage Plain is cut by the large streams descending from the west slope of the Rocky Mountains forming long canyoned valleys. These streams cut through the nearly horizontal beds of strata through the Dakota formation into the underlying Upper Jurassic formations of which the local type is the Morrison formation.

The Dolores River rises from the west side of the La Plata Mountains. It runs through a narrow valley cut into the rocks forming bluffs on either side of the river which eventually rise over 1200 feet high.

The hill on which the Escalante Ruin rests is a Dakota formation. This Dakota layer was pushed up along a fault so that it lies 100 feet higher than the surrounding plain, also of the Dakota formation and covered by the Mancos Shale.

The surface of the hill is a conglomerate of rolled river cobbles held in a gravel matrix. Below it occurs a gray clay and in the hillside are seen other levels of sandstone.

The stream bed deposit is laid bare across much of the hill surface but below the ruin it is overlain by a shallow deposit of brown earth, residue to the Mancos Shale layer. This suggests the possibility that at the time of occupation this thin soil layer had also been present across the hill surface.

Natural Resources

Agriculture

The location of the Escalante Ruin is above and overlooking a 60 m wide floor plain, the Dolores River, of rich alluvial soil

suitable for flood water farming. This type of farming was practiced in Chaco Canyon (Vivian and Mathews 1964:12-13). The location of the Escalante Ruin above the flood plain might indicate a desire by the builders of the pueblo from Chaco Canyon to select a site where the agricultural conditions would be similar to that found in the Chaco Wash. The plain below the hill has moderately dark colored deep soils which provide for good cropland (Draft Environmental Statement 1957:II-53, Figure II-10) and would be suitable for dry land farming.

The area of Dove Creek located northwest of the Escalante Ruin is today used for agriculture, and produces wheat, beans, corn and other products (Draft Environmental Statement 1975:II-10-11). This indicates a growing season adequate for the Anasazi crops, which usually included corn, beans, and squash.

Flora

The Escalante Ruin is within the Upper Sonoran life zone, 4500 to 7500 feet and characterized by pinyon, juniper and sage brush. The environment on the hill itself is transitional pinyon-juniper woodland and brushland type. Figure 2 gives a view of the uncleared growth on the site. Modern trees and shrubs identified on the hill itself were: Juniper (*Juniperous* sp.), Pinyon pine* (*Pinus edulis*), Service berry* (*Amelanchier utahensis*), Sage (*Artemesia tridentata*), Mountain mahogany (*Cercocarpus montanus*), Rabbitbrush (*Chrysothamnus nauseosus*), Fendlerbush (*Fendlera rupicola*), Squawapple* (*Peraphyllum ramosissimum*), Gambel oak* (*Quercus gambelli*), Currant* (*Ribes* sp.), Snowberry* (*Symphoricarpos oeophilus*), Yucca* (*Yucca baccata*). Herbs found on the site include: Yarrow* (*Achilla millefolium*), Fern (*Cheilanthes* sp.), Goosefoot* (*Chenopodium album*), Thistle (*Cirsiam* sp.), Wild buckwheat* (*Eriogonum* sp.), Resinweed (*Grindelia* sp.), Beardtongue

Figure 2: View of the uncleared growth on the site.

(Penstemon sp.), Cholla* (Opuntia fragilis), Prickly pear* (Opuntia sp.), Indian Rice Grass* (Oryzopsis hymenoides), Orange Globe Mallow (Sphaenalcea cossinea). The starred bushes or herbs are ones which either produce an edible part or can be eaten.

The land on the plain below the hill is primarily brushland with some pinyon-juniper woodland. The riparian environment in the Dolores River valley below the site was described by Newberry in 1876 as being "nearly level, half a mile wide and very fertile, covered with fine grass, with groves of cottonwood and willow and scattered trees of yellow pine, thickets of virgins's bower and hop, and abundant flowers" (Newberry 1876:86). This environment could have supplied wild berries and fruits as well as being used for agriculture. Extensive listing of plants generally found in these environments can be found in Gregory (1938) and Brew (1946).

Modern History

The first written reference to an archaeological site in Colorado was on August 13, 1776, when Escalante recorded in his journal the ruin believed to be the Escalante Ruin. Silvestre Velez de Escalante had noted in his diary that: "On an elevation on the south bank of the river in ancient times there was a small settlement of the same form as those of the Indians of New Mexico, as is shown by the ruins which we purposefully examined" (Bolton 1972:141). The Escalante Ruin is the first historically recorded site in Colorado and is therefore of interest to people of the region. The Escalante expedition had started out July 29, 1776, the same year as the birth of the United States on the Atlantic seaboard. The purpose of the expedition was to work out a new route from Santa Fe to the Spanish settlement of Monterey on the upper California coast. The ten-men expedition was led by Fray

Francisco Atanacio Dominguez. Fray Silvestre Velez de Escalante had planned the expedition and kept a journal of the trip. The journey started from Santa Fe, went north to the San Juan, followed the trappers' trail northwest past Mesa Verde, descended the Dolores, cut across to the Uncompahgre Plateau to the Gunnison River moving northward to the Green River from where they headed west to Utah Lake and then south and west following the edge of the Sevier Desert back to Santa Fe.

Other Spanish explorers, trappers, gold seekers and traders had passed through the region of the Colorado River and as far north as the Gunnison River. Bolton (1972:7) suggests that this region had become fairly well known to the Spanish traders of New Mexico by 1776. A member of the Escalante Expedition, Andres Munis de Bernalillo, guide and interpreter of the Yuta language, had traveled twice before as far as the Gunnison River: once with the Riveria Expedition of 1765 and again in 1775 with a small party probably following the same route taken by the Escalante Expedition (Bolton 1972:7). However, none of these early travelers are known to have left a written record of the ruins of the San Juan which they might have encountered, so Escalante is credited as being Colorado's first archaeological site recorder.

Following the Escalante expedition little attention was given to the region or the ruins. However, three events in the 1840's caused further explorations in the Southwest which brought the ruins to the attention of the scientific world: the Mormon migration to Utah, the California gold rush and the war between the United States and Mexico.

These events produced the three types of explorations given by Brew (1946:17): (1) Mormon surveys for colonization, (2) official government explorations under the War Department and the

United States Geological and Geographical Survey of the Territories; and (3) railroad surveys.

The first official survey which included the Dolores River Valley was in 1859 by a party led by Captain J. N. Macomb of the Corps of Topographical Engineers which was exploring from Santa Fe to the junction of the Grand and Green Rivers. Macomb's route from Santa Fe as indicated on the map accompanying the geological report follows Escalante's path until it diverges at the approximate site of the Escalante Ruin. Macomb reports that "The greater part of the journey from Abiquiu to this point (Ojo Verde, almost to the junction of the Grand and Green Rivers), was by the Old Spanish trail, which has not heretofore been accurately laid down upon any map. This route has been much talked of as having been the route of commerce between California and New Mexico in the days of the old Spanish rule, but it seems to have been superseded by routes to the north and south of it which have been opened by modern enterprise" (Newberry 1876:5).

Accompanying Macomb was Professor J. S. Newberry who submitted a report on the geology of the region and included descriptions of the ruins encountered. His description of the view from the hill of the surrounding countryside and his description of the geology of the hill corresponds to the view and geology of the Escalante Ruin.

> From the summit of the hill . . . we obtained a magnificent view of a wide extent of country lying on every side of us. In the east the Sierra del Plata rose as a high and unbroken wall, presenting a more varied outline than when seen from the other side; south of the Sierra, the puerta through which we had passed; beyond this, stretching far off southward, the green slopes and lofty battlements of the Mesa Verde beetling over the plain like some high and rock bound coast above the level ocean; south and near us, the miniature peak and chain of La Late; far more distant, the Sierra Carriscon and Tunecha in the Navaho country; occupying the

whole western horizon the monotonous expanse of the Sage-plain, beyond which rose the summits of the Orejas del Oso, Sierra Abajo, and Sierra la Sal. In the north appeared a new and grand topographical feature. From N. 10^{o} W. to NE magnetic stretched a chain of great mountains higher and more picturesque than any we had yet seen. (Newberry 1876: 87).

His description of the ruins does not seem as consistent with the excavations:

> The hill from which we obtained this view is crowned with an extensive series of very ancient ruins. The principle one is a pueblo, nearly square, once substantially built of dressed stone, now a shapeless heap, in which the plan of the original structure can however be traced. Like most of the ruined pueblos of New Mexico, it consisted of a series of small rooms clustered together like cells in a beehive. Near the principle ediface are mounds of stone, representing subordinate buildings. Among these are large depressions marking the places of cisterns or estuffas. Quantities of broken pottery similar to that so commonly seen in like circumstances, but bearing the marks of great age, strew the ground about these ruins (Newberry 1876:88).

The F. V. Hayden party of the United States Geological and Geographical Survey of the Territories brought to the attention of the public the importance of the ruins within the Mesa Verde region, principally through the archaeological surveys reported by W. H. Jackson (1876, 1878) and W. H. Holmes (1876). Holmes (1876: 386) reports on several ruins near the bend in the Dolores River. One, which he describes with some detail, is located near the Escalante Ruin on the low ridge. He mentions further: "At two other localities near the South bend of the Rio Dolores I observed similar groups of standing stone, about which was the usual accompanyment of pottery and flint chips" (Holmes 1876:386). Holmes had possibly looked on the Escalante Ruin but the reference is too vague to be certain.

Following these initial descriptive reports, there was a period of sporadic excavations across the Mesa Verde area and of extended surveys.

T. Mitchell Prudden, a New York medical doctor who worked with the Wetherills, became interested in "small house ruins" and through 1914 to 1918 he located and excavated a number of sites in the San Juan. Fewkes (1919:12) recorded that Prudden had mentioned ruins at the Dolores bend.

J. Walter Fewkes, who conducted numerous excavations on Mesa Verde, became interested in the location of the Escalante Ruin and wrote an article about it entitled, "The First Pueblo Ruin in Colorado Mentioned in Spanish Documents" (Fewkes 1917). However, he had not visited the site when this article was written and he confused it with another site, probably the Emerson Ruin. In 1919 Fewkes reports in his description of sites west of the Mesa Verde a more accurate description of these sites indicating that he had surveyed them for himself. He presented a detailed description of the Escalante Ruin:

> The name Escalante Ruin, given to the first ruin recorded by a white man in Colorado, is situated about 3 miles from Dolores on top of a low hill to the right of the Monticello Road, just beyond where it diverges from the road to Cortez. The outline of the pile of stones suggests a D-shaped or semicircular house with a central depression surrounded by rooms separated by radiating partitions. The wall on the south or east sides was probably straight, rendering the form not unlike the other ruins on hilltops in the neighborhood of Dolores (Fewkes 1919:36).

The descriptions of the site as presented above all seem to indicate that the same site might have been viewed by the observers. The difference in the descriptions were probably due to the vegetation growing on the site which obscured a complete view of the ruin; and also due to the unfamiliarity of the observers with the shape and form of the ancient Anasazi ruins. Although Escalante's reference is very brief, the hill on which the Escalante Ruin rests is distinctive enough in its position and size to have been the elevation which Father Escalante had ascended.

The site of the Escalante Ruin is part of the public domain and is under the jurisdiction of the Bureau of Land Management. The Bureau of Reclamation has used the hill as an elevation marker for surveys in the area since the location was easily viewable and a bench mark was placed on the surface of the site.

From the years 1965 to 1970 the University of Colorado Archaeological Research Center conducted an archaeological inventory and evaluation of the Indian Ruins on the Public Lands for the Bureau of Land Management. The Escalante Ruin was the final site recorded in 1970 when it was designated as 5MT2149. The site was recongnized at that time as fitting the location of the site Escalante had described in his journal.

Field Methods

In the 1975 field season the excavations were begun by clearing the site of the dense overgrowth. The pinyon pine and brush were cut with a chain saw and the bushes were removed with pickaxes.

After mapping the height and extent of the mound in relation to the surface of the hill, excavations began in the kiva depression, Kiva A, and in one room, Room 2. Since not all of the pueblo was to be excavated, it was decided to dig the sections adjacent to Kiva A to the east and to define the exterior walls of the pueblo.

The rooms and the kiva were designated as the basic features and therefore were excavated as units. The method of excavation was to first define the inside walls of a room. Then the room was excavated by removing the fill according to the levels following the natural stratigraphy where it occurred or by arbitrary levels within the natural levels about 15 cm in depth. The levels were

identified and the fill and artifacts were designated with field specimen numbers according to their presence within the natural levels. Test windows were dug in the fill against a wall to determine the depth of a level or proximity to the floor. Whenever a floor level was found, the fill would be cleared to within 5 to 10 cm above it. This level, designated as Floor Fill, was troweled to the floor surface, and the artifacts from the Floor Fill were placed in a separate provenience. Artifacts found directly on the floor were left in place to be mapped and recorded separately.

The floor was then mapped, profiled, and photographed. Floor features were profiled and sampled. A test trench reaching the native sterile earth was made in the floor to determine the composition and depth of the floor and to determine the location of the wall bases. Soil and pollen samples were taken from the floor at this time. Finally a description of the room and all the features was made. Figure 3 shows the 1975 excavation in progress.

In the 1976 field season the rooms were excavated in halves by 20 cm levels or following natural levels where they were distinguishable. When a floor level was encountered the floor fill was left in place above the floor and the profile seen in the other half of the room was drawn and then excavated by the natural levels. The floor fill and floor were then cleared, artifacts recorded as they were excavated and the floor recorded as described above.

The site was mapped using a plane table and alidade located above a bench mark placed in the fill of the ruin by the Bureau of Reclamation. The metal cap, labeled "Big Bend," was 7214.24 feet above sea level. This mapping method was used for the preliminary topographic map and for the final map of the site. The individual

Figure 3: Excavations in process in the 1975 field season, showing Rooms 2 and 5 cleared and Kiva A partially cleared.

rooms and Kiva A were mapped using a Brunton compass and metal tape measures.

All field measurements were made in the metric system although the stadia rod used for the preliminary mapping was in the English system and some of the room maps use scales in both English and metric systems.

Field specimens were first sorted into general categories: sherds, lithic, or bone and were then placed in paper bags and labeled as to site, provenience, type, date, and excavator. These were then taken to the laboratory at the end of each week's excavation for cleaning and analysis. Part of the analysis was completed during the field season at the Mesa Verde Research Center with the rest completed during the fall and spring at the University of Colorado Laboratory. All specimens were removed from the site for further analysis except for the metates and large slabs from the 1975 field season. These were drawn and analyzed in the field, and at the end of the excavations were reburied on the hill off of the site.

Tree-ring specimens were wrapped with string and labeled, then soaked in a solution of saturated paraffin in gasoline. After drying these were wrapped in foam or cotton and securely tied with string for shipment to the Laboratory of Tree-Ring Research, University of Arizona.

CHAPTER II

ARCHITECTURE

Setting

The Escalante Ruin is located on the southern edge of a long narrow hilltop and overlooks the wide flood plain of the Dolores River. The river makes a sharp turn at the Escalante hill and heads north from this point, creating a wide flood plain in the valley. The site has a commanding view of the flood plain below as well as a wide view of the area in every direction since it is the highest point in the immeditate vicinity. A number of smaller ruins are located to the south at the bottom and on the hillside of the Escalante hill. One of these is the Dominguez Ruin, site 5MT2148, excavated by the University of Colorado Research Center in 1976 (Reed, 1977 and this volume). Figures 4 and 5 show the Escalante and Dominguez Ruins after excavation and stabilization.

Plan

The architecture and layout of the Escalante Ruin (fig. 6) is identifiable as being of Chaco style. The pueblo is rectangular in shape, 25.30m in length and 19.23m in width, with a single Chaco-style kiva in the center. Double rows of rooms are located on the east, north and west sides, and on the south side there is a single row of rooms of the same architectural style which was added to the pueblo at a later date. The kiva within the room block, Kiva A, is built partially above ground, and set in a quadrangle of striaght walls.

A second kiva depresssion is to the immediate south of the room block. A test-trench across the depression revealed that this kiva is a Mesa Verde style kiva which is set below the

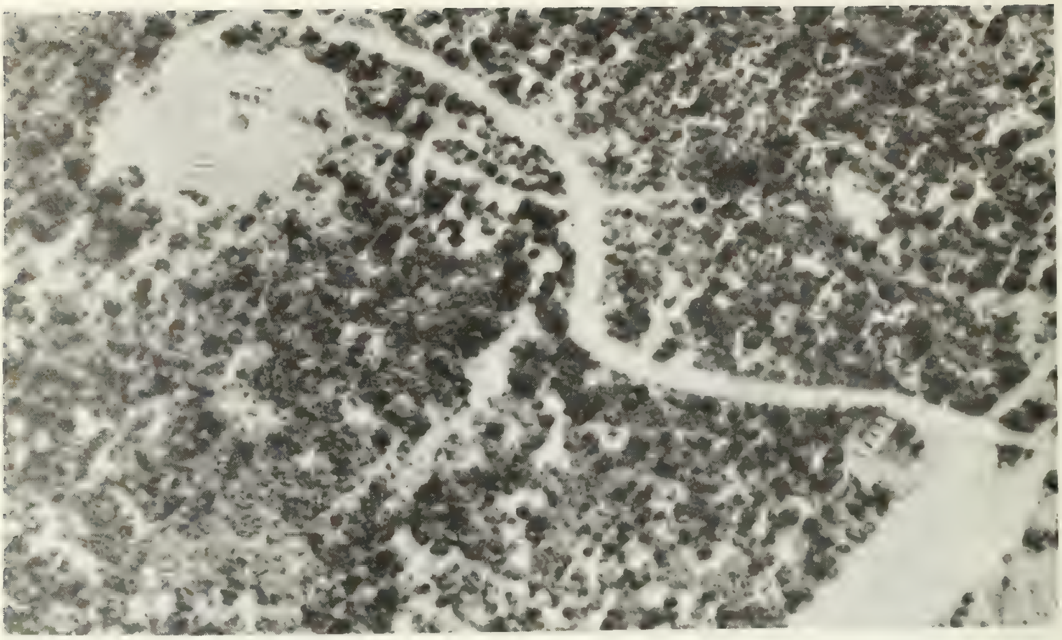


Figure 4: Aerial view of the excavated and stabilized Escalante Ruin on the hilltop and the Dominguez Ruin on the plain below at the edge of the hill.

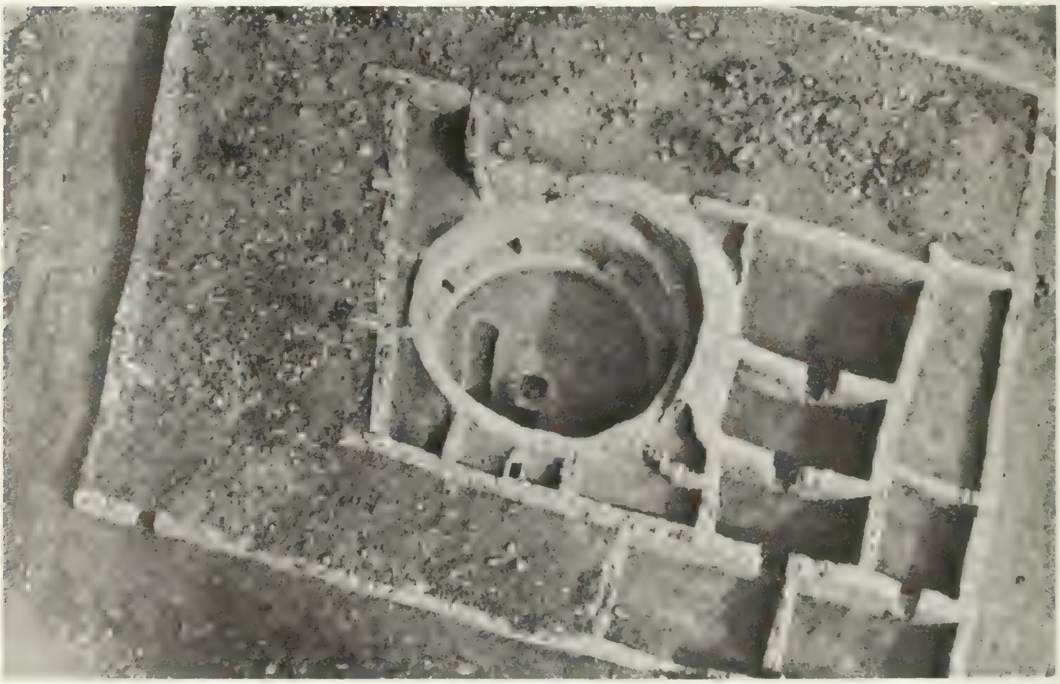


Figure 5: Aerial view of the Escalante Ruin, after stabilization.

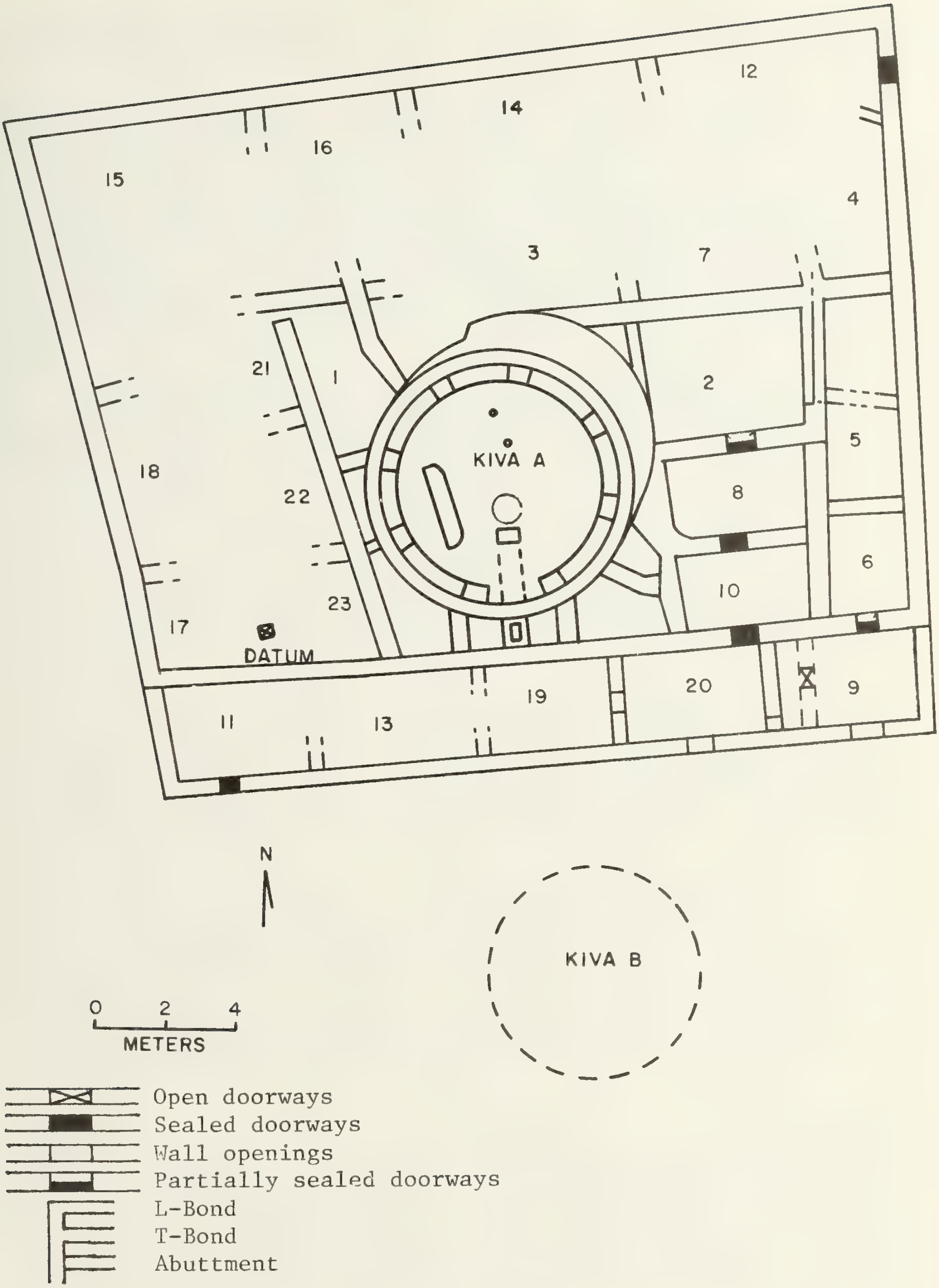


Figure 6. Plan view of the Escalante Ruin.

ground. It probably postdates the main Chaco occupation of the site.

Located to the west of the pueblo is a shallow trash accumulation on the hill surface which is washing down the hillside. The accumulation seems shallow since the natural gravels which can be seen on the surface are accompanied with few artifacts; but the area has not been tested, so the depth of the trash remains uncertain.

Testing to the depth of the exterior wall of the pueblo revealed that the space along the outside of the pueblo was used for work areas. Along the west wall there had probably been a ramada-type roofed structure over a well-used work area. On the east side, a wall extending about 4m from the exterior pueblo wall may define a contemporaneous work area or an earlier structure. More testing and excavation is needed to adequately define the use of these areas.

There appear to be 25 rooms in the pueblo as seen in the site map, this number being approximated from the depressions and ridges seen in the unexcavated portions of the pueblo.

The rooms excavated are large and deep, similar to the size of rooms found in Chaco architecture. The highest standing wall excavated was in Room 2: 230cm in height. At this height there is no evidence of a ceiling support in the walls, indicating that the ceiling was at least this high and probably higher.

Condition

When the site was cleared of vegetation the extent and shape of the pueblo was clearly seen. The rubble on the site stood to a maximum height of 5m above the surrounding hill surface. Sandstone building blocks were seen on the surface and the room loca-

tions could be discerned by the depressions between the higher mounded walls. Kiva A was a deep depression but the radiating partitions around the depression reported by Fewkes in 1919 and discussed previously were not discernable.

Two rooms had been excavated prior to the beginning of our excavations. These are designated as Room 1 and Room 4 as seen in Figure 6. Room 1, which is actually not a room but a section of the quadrangle surrounding Kiva A, had eight to ten courses exposed and was in good condition. Room 4 was exposed on three sides and partially exposed on the fourth side. This room had sheets of corrugated tin in the room, suggesting that it had been used as a "club house" by local children.

An electric power pole, located on the hill to the northwest of the ruin, was removed before the 1976 field season; and a radio tower which had stood on the hill northeast of the ruin had been removed before the 1975 excavations began.

Remarkably few artifacts remained on the surface of the site although previous explorers had mentioned the great accumulations of artifacts. Probably these were removed by persons visiting the site.

General Remarks on Wall Construction

A general discussion of the material and techniques of wall construction follows in this section.

Materials

The material used in the walls is principally sandstone, although some river cobbles were used as discussed below. Five different types of sandstone and one shale type are used. The

sandstone all appear to be types of Dakota sandstone which may be located close to the site as indicated by the geology, but the exact quarries were not found. Two of the sandstones are massive, blocklike, soft calcareous stone which were used as block as large as 12 by 37 cm on the face and 24 cm in width. These stones appear to be hewn somewhat and the surface is often pecked. The third type of sandstone is a laminated, dark colored sandstone. A fourth type is a white, soft sandstone which crumbles and erodes easily. This type is used infrequently in the walls. The fifth type is a sandstone with a wavy surface, which was difficult to break evenly so was used in irregular shaped blocks. This type is used in upper courses of some walls, indicating a possible re-building of collapsed walls when other stone was less accessible; also the inner wall of the crescent wall surrounding Kiva A was built with this stone. The shale is a blue-gray crumbly stone used infrequently as a filler or for chinking.

River cobbles were utilized in wall construction. There is occasional use of river cobbles in the masonry of the room walls when the size and shape of the cobbles approximates that of the shaped sandstone blocks used in the wall. The foundations of the walls were built of river cobbles. The base of the wall found in the floor of Room 5 is built of flat river cobbles. Large river cobbles, up to 50 by 30 by 15 cm, are also used in the construction of most of the buttresses around Kiva A. Also, river cobbles are used as the rubble core, set in mortar, within the crescent wall surrounding Kiva A.

The river cobbles used in the construction of the site were probably not brought from the Dolores River below but were from the native fill of the hill surface. This is the gravel and cobble basal conglomerate as discussed in the geology section. The river cobbles used in the supporting structure of Kiva A could

have been supplied from the pit dug for the Kiva A base and floor features.

Two kinds of mortar are used. The mortar in the majority of the walls is brown (7.5 YR 5/4) (Munsell Color Co., Inc. 1954). This mortar compares in color to the local soils found on the plain below the hill. A light gray mortar, of which two shades can be distinguished (10 YR 7/1 and 2.5 Y 7/2), is used in the construction of Kiva A and is also found in the walls of the addition of rooms along the south exterior wall of the pueblo. These mortar colors compare with the natural fill occurring below the alluvial deposit of the surface of the hill, the two shades depending on the degree of mixing of the mortar. This earth would have been available from the pit dug for the Kiva A base, and it also outcrops on the hill slope to the south of the pueblo.

Construction

Several different types of walls occur at the Escalante Ruin. The majority of the walls are compound walls, coursed on both sides with a narrow rubble fill, approximately 50 cm in width (Fig. 8). The core is composed of unshaped sandstone and mortar.

The use of simple walls only one stone wide is frequent in the excavated rooms. These include a short section in the west wall of Room 2 which is faced on one side and backed with clay fill (Fig. 7); the section in the east wall of Room 2 which is faced on both sides and stood at one time as the west wall of an earlier room; the north wall of Room 4; and the northern-most section of the west wall of Room 8 which begins as a simple wall but expands to the use of a retaining feature along the crescent wall of Kiva A and then forms the south wall of Room 8 which is a compound wall with no rubble fill.

The crescent wall (Fig. 60) enclosing the northeast side of Kiva A is a compound wall with a wide rubble fill, faced on both sides with a narrow face to the exterior and a wide inner face of exteremely crude masonry built with the Type 5 sandstone (as described above). The width between the two faces is 1 m, and the core is composed of river cobbles held in mortar. This type of wall is similar in construction and width, though not in appearance to the type Vivian and Mathews (1966:108) identify as being used in the Bonito Phase, exemplified in Pueblo Bonito.

Two of the walls are of dry-laid construction. These occur in the north and south walls of Room 5, which are of dry-laid and partially dry-laid construction respectively. The occurrence of dry-laid walls is not mentioned in Chaco architecture but is known to have occurred in other Anasazi architecture. Kidder and Guernsey (1919:26, 33, 53, Plate 6c) record a small watch tower, four rooms of a cliff dwelling and a small granery, "peculiarly constructed," noting that no mud mortar was used, all of which are located in the Monument District of northeast Arizona. Roys (1936:146) reports from information from a letter from Robert Burgh the occurrence of dry wall masonry in Cliff Palace, Mesa Verde, in a wall against the cave roof in the upper gallery and possibly in the turkey pens at the back of the cave. Roys also discusses the use of dry-laid masonry for reservoirs in the Mesa Verde area and suggests that the use of dry-laid masonry could have been in continuous practice in Mesa Verde from Basket Maker times, though only rarely seen in pueblo construction. The dry-laid masonry occurring at the Escalante Ruin, which is a feature of the reoccupation of the site, appears to be a Mesa Verde architectural feature.

Styles

The first three of the four styles of masonry encountered at the site appear to be very similar. The internal construction, when noted during stabilization, includes a generous amount of mortar between the stones and in most cases there does not seem to be a stone-to-stone contact. This is consistent with a Chaco-type masonry as it was analysed by Roys (1936:119-120) from examples in the Lowry Ruin.

The masonry variations encountered seem to differ by the physical properties of the type of sandstone used. These variations demonstrate a blending of styles. For example, one long wall (as viewed in the east walls of Rooms 5 and 6) shows a change in masonry style where one type of sandstone is replaced by another. In addition, these variations occur within a block of rooms which appear to be a part of the planned layout of the pueblo and which were probably built within a short period of time by the same group of people.

The best example of Style 1 masonry is seen in Room 2. Roughly shaped sandstone blocks are set in uneven courses due to the range in sizes of blocks used, which varies from 4 by 23 cm to 12 by 37 cm. Rows of sandstone spalls are set in the mortar between the courses and continue in the fill between the stones within the wall. The chinking, achieving almost a decorative pattern, is fairly regular throughout the room, but is the most regular in the simple wall in the west wall of the room (Fig 7), which employs more uniformly sized building stones in the wall. The other walls of the room demonstrate the use of irregular sized blocks and an increasing use of larger blocks. In Room 8 adjoining and built onto Room 2, the blocks used are larger although there is a range in the size of the blocks, and the chinking though still present is less regular. The transition of the style

Figure 7: The west wall of Room 2 showing the Style 1 masonry.

may indicate that it was evolving to another form by carelessness or by the property of the stones available or by individual styles of two different builders. This style compares with Hawley's Type IV masonry (1934:14-15, 28) dated A.D. 1100 to 1116, and seen in Chetro Ketl and Kinya'a, where there also occurred a marked irregularity in the size of the blocks used.

It is interesting to note that there is an occurrence in the Style 1 masonry (Fig. 7) of a small sandstone block set vertically into the wall instead of being laid along the structurally sound horizontal plane. Similar occurrences are also seen in the walls in Kiva A.

Style 2 is exhibited by the long wall which forms the east exterior wall of the pueblo. This wall continues further to the west and forms part of the perimeter of the original pueblo. Where the face of the wall is seen in the interior of Room 4, the masonry face consists of spalled and pecked sandstone blocks set in courses with thinner slabs generally alternating between thicker slabs. Further to the south, as seen in the east and south walls of Room 6 (Fig. 8), long thin slabs with unshaped faces are used in the wall. Spalls are rare in the wall and do not exhibit the patterning between courses seen in Style 1. This style includes then walls which are constructed similarly to Style 1 but the block size is more variable, treatment in the shaping of stone is less uniform, and the decorative patterned chinking is only sporadically present.

Style 3 masonry is found in the south and east walls of Room 9, which is an addition to the original southern edge of the pueblo (Fig. 9). The section of wall traced at the western corner of the pueblo indicates that this masonry style continued along the entire southern addition to the pueblo. These walls are

Figure 8: The east wall of Room 6 showing the Style 2 masonry.

Figure 9: The south wall of Room 20 showing Style 3 masonry.

narrower than the rest of the compound walls in the pueblo with the individual blocks measuring approximately 7 by 15 by 20 cm. These are set close together in fairly regular courses. The gray mortar used in the walls is different from that in other room walls but is also found in the walls of Kiva A. The use of the small, regular-sized blocks is also similar to the Kiva A walls, perhaps indicating a comtemporaneity of building.

Style 4 is a rough grouping of the later additions to the architecture: the dry-laid wall in Room 5 (Fig 40), the masonry seen in the blocked doors in the south walls of Room 8 and Room 9, the west wall in Room 9, and the intrusive wall in Kiva A (Fig. 66). These are much different from the masonry types described above and can be considered to be non-Chaco by Roy's criteria (1936). They exhibit the use of little or no mortar, and the stones are set closely together or touching. Little care was taken to form good bases to the walls or to evenly face a section of wall which would occur below the level of the heightened floors. The evidence of these features accompanied by the fact that all were built in the reoccupation of the site indicates a non-Chaco style of masonry which is not inconsistent with a Mesa Verde style of architecture.

Some decorative elements are included in the north exterior wall of the pueblo. A five course decorative band, 28 cm in height, of narrow stones, is set above one wide course along the base of the wall, which is 16 cm in height (Fig. 10). This band was noted in the test trench at the center of the north wall and presumably continues along the extent of this wall, although it is not found on the exterior of the other walls which were also tested.

There is evidence of a second decorative feature in the north wall. Seven building stones with pecked designs on one face were

found at the site (Figs. 25-31). Four of these came from the rubble fill encountered along the exterior of the north wall in the excavation of this area for stabilization. The other three lack provenience. Since none of these stones were found in the wall, they must have been used at a higher level than the height of the standing walls, approximately 77 cm.

A single stone sculpture was found on the site, north of Kiva A, which may have been built into a wall (Fig. 31). The sculpture is carved from a sandstone block, one end of which is a blocked building stone, the other end is an animal head, possibly a young bison or mountain sheep. From its location on the rubble fill of the site it may be presumed to have been incorporated into a wall surrounding Kiva A.

Bonding

New walls are commonly abutted to a previously standing wall, which is a good indication of building sequences. Of the corners which are tied, or bonded, to form curved corners. One curved corner occurs in the southwest corner of Room 8, and one in the northeast corner of Room 6 (Fig. 8) which is curved only in the bottom 8 courses.

There is one case of a wall connection which is part abuttment and part bonded: in the east wall of Room 2.

Architectural Details

The excavations at the Escalante site included approximately one-third of the pueblo. Three occupations of the pueblo were indicated.

The entire pueblo room block with the enclosed kiva had been built in the original occupation. From the evidence of the excavations a building sequence, as follows, is indicated. There is evidence of a single early room (with single course wide walls) in

Figure 10: Decorative band seen in the lower courses in the test trench along the north exterior wall of the pueblo.

the north half of Room 5 and extending through to the north wall of Room 4. Room 2 was built between this earliest room (after the south wall of the earliest room was removed) and Kiva A, against the crescent wall surrounding Kiva A. The other rooms were added onto Room 2 probably within a short period. The layout, bonding of the walls, and similarities of the masonry in Rooms 2, 8, 10, 5, 6, 20, Kiva A, and in the stabilization trenches indicates that these rooms and possibly the rest of the unexcavated pueblo represents a planned layout in the form of a rectangle with the kiva enclosed in the house block. As an addition during the first occupation, a row of rooms with a slightly different wall construction was added to the south end of the pueblo.

The seven excavated rooms had access to each other in the original occupation. Room 2, Room 8, Room 10, and Room 20, lying in a north-south alignment, had a series of "T"-shaped doorways connecting them. Rooms 4, 5, and 6 had probably been part of a single long room with a door connecting with Room 9 to the south. It is unknown if there is a door connecting Room 4 with rooms to the north. These two blocks of rooms connect to each other through the breaks in the walls between Rooms 20 and 9. A wall break in each of these rooms leads to the exterior of the pueblo and a break in the west wall of Room 20 gives entrance to rooms to the west.

Discussion of the room use follows in Chapter III with the artifact distribution analysis. However, room 2, with a firepit, is identified as having been a living and a work area; Room 8 used as a work room and possibly a sleeping room; Room 10 as a grinding room; Room 20 used for multiple cooking and food preparation area; Room 5 and 6 (and possibly extending through Room 4 as well), one long room at this level, was possibly used for storage; and Room 9, by evidence of the large firepit and the breaks in the walls

leading to the exterior and to Room 20, makes it probable that it was also used for food preparation. The adjoining Rooms 2 and 8 appear to have been habitation rooms for a family unit. The remainder of the rooms are special function rooms for grinding, cooking or storage. These might have been used by the single family unit or might have been communally shared by the entire pueblo.

As discussed previously, the masonry style of the original pueblo walls are more consistent with a Chaco Region influence than a Mesa Verde Region style. The planned layout of the pueblo, the large size of the rooms, the kiva enclosed in the house block and a Pueblo Bonito style kiva (with a circular shape, bench recess, subfloor ventilator tunnel, log and masonry pilasters, and large size) all suggest a Chaco Region style architecture.

The second level rooms were found in all of the excavated rooms. Evidence of similar levels in the stabilization trenches suggest that this occupation may have included most of the pueblo. These floors are built on fill approximately onehalf meter above the original floors and the architecture in the rooms show some remodeling such as blocked doors and a new wall. The remains of the intrusive wall in Kiva A probably also dates from this occupation. Construction of Kiva B might have been started by these inhabitants.

The arrangement of the seven rooms in the second occupation suggest four habitation clusters. Rooms 2 and 8 adjoin through one door and must have had an exit through the ceiling in one or both of these rooms. There is little data on the use of these two rooms but their arrangement suggests a single family habitation unit. Room 5 does not connect with any other room, and probably had a ceiling entrance. The floor had a firepit but there is

little evidence for the use of this level. Room 10, Room 20, Room 9, and Room 6 join through mutual doors or wall breaks and have an exterior exit through Room 20. Room 20 also connects with rooms to the west through a wall break. The floor features indicate uses for some of these floor levels. Room 10 with a firepit was used for food preparation and living space. Although it adjoins through a T-shaped door with Room 20 it appears that Room 10 might have been used as a single room unit. The evidence of a door slab on the floor in Room 10 before the door into Room 20 indicates that it could be closed off from Room 20. Room 20 had no features and no indications of use, and with breaks in the walls to the east, west, and south, might have been used only as an exit to other rooms or the exterior. Room 6, with a firepit in the corner of the room, was probably used as a living and a work area. There were two floors in the second occupation level of Room 9, defined only in the west half of the room. The original floor had a possible firepit, and the second floor had some artifacts including part of a smashed corrugated jar. These two rooms, Rooms 6 and 9, probably represent a two room habitation unit.

Several features in the architecture and arrangement of the rooms between the two occupations suggest that the occupations were not by the same people.

The arrangement of the excavated rooms in the second occupation is different from the original occupation. In the second occupation the rooms are broken into one and two room units with no evidence of communal activity rooms. In the first occupation all of the rooms adjoined with each other and five of the seven rooms had indications of communal group activities. This sample of excavated rooms suggests that there may have been a different social organization for the inhabitants of the two different

occupations. However, further excavation in the remaining rooms of the pueblo would be necessary to confirm this sample which may not be presenting an accurate picture of the use of the pueblo.

The masonry seen in the architectural modifications displays a much cruder style in the second occupation than in the first. This includes the use of dry-wall masonry which as discussed previously in the chapter, appears to be a Mesa Verde Region style. The heightening of the floors suggests a desire to make rooms with lower ceilings. Kiva B (Fig. 11), with a southern recess and masonry pilasters, shows a much different architectural construction and design than Kiva A built in the original occupation. This style of kiva construction is more typical of kivas of the Mesa Verde Region. Although this evidence may indicate an historical continuum for a single culture, the differences suggest that these were two different cultural groups, the second occupation possibly of the regional "Mesa Verde" type.

The third occupation, evidenced in only two rooms, is well represented by only one floor, from Room 9A. Similar occupation levels were not found in any of the stabilization trenches around the exterior walls of the pueblo. The room had been used for a habitation with cooking, food preparaion and other activities. It appears to represent a temporary reuse of the site which may not have any further occurrence on the remainder of the site.

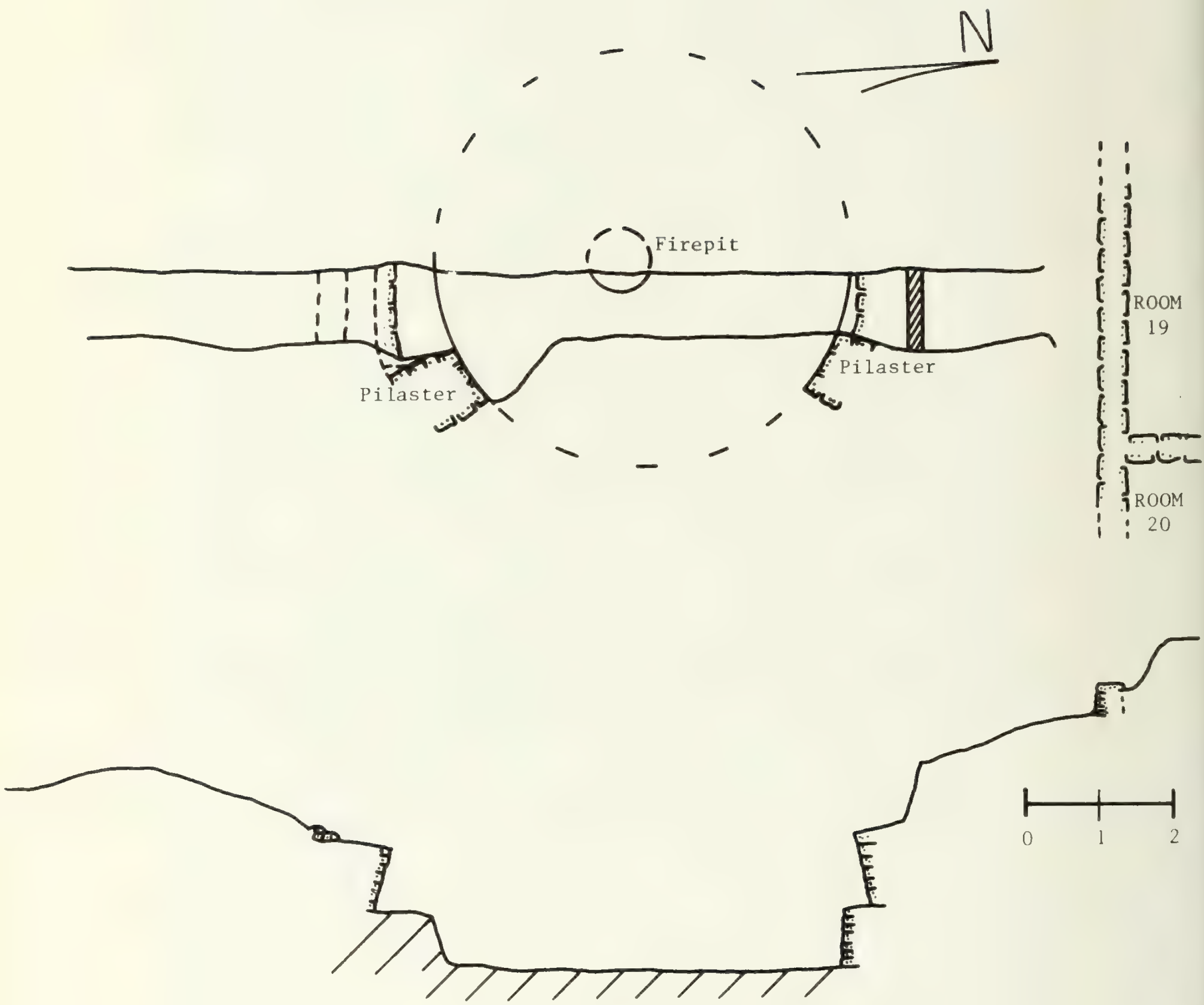


Figure 11. Map of the test trench in Kiva B.

CHAPTER III

ARTIFACT ANALYSIS

There was a general paucity of artifacts encountered at the site, both on the surface and within the excavation units. The historical evidence as discussed in the introduciton suggests that there had been a greater occurrence of artifacts on the surface which have probably been removed by visitors to the location due to the renown of the site. However, the scarcity of artifacts found in the excavation and the evidence of the shallow trash accumulation in the trash pit location suggests that the total occupation of the site, including the original occupation and the subsequent reoccupations, was of short duration.

Ceramics

Types

Of the 9,751 sherds 2,702 were classifiable into types. Of these the predominant ceramic types present were of the Mesa Verde Ceramic Series. Almost the whole range of possible types in the series from early to late appeared. The preponderence of classifiable sherds, 83.6 percent, or 23.2 percent of the total number of sherds, were of four types falling in the late Pueblo II to early Pueblo III range (Figs. 12-15), indicating a time span of A.D. 1100 to 1150. These types are shown in Tables 1 and 2.

Trade wares are present from the site representing 3.82 percent of the total sherd assemblage and 11.84 percent of the classifiable sherds. Trade from within the region and with three other regional area is indicated. Tusayan Black-on-red, Tusayan Poly-

TABLE 1

PERIODS, DATES, AND NUMBERS OF SHERDS
GIVEN FOR THE PREDOMINANT CERAMIC TYPES

Type	Period	Date	No. of Sherds
Mancos B/W	Pueblo II	A.D. 900-1150	1,361
McElmo B/W	Pueblo III	A.D. 1075-1275	535
Mancos Corrugated	Pueblo II	A.D. 900-1200	232
Mesa Verde Corrugated	Pueblo III	A.D. 1100-1300	129

TABLE 2

NUMBERS OF SHERDS BY TYPE FOR THE ROOMS AND KIVAS. PERCENTAGES GIVEN BY TYPE FOR THE RELATIVE AMOUNTS TO THE CLASSIFIABLE SHERDS AND TO THE TOTAL NUMBER OF SHERDS

Types	Rm 2	Rm 5	Rm 6	Rm 8	Rm 9	Rm 9A	Rm 10	Rm 20	Kiva A	Kiva B	Stab.	Other	Total	% of Class	% of Total
Mancos B/W	341	120	76	85	159	36	70	33	326	23	28	64	1361	50.31	13.86
McElmo B/W	78	20	30	52	42	33	104	39	53	20	36	18	525	19.41	5.34
Mancos Corr.	54	32	30	46	4		3		51		1	9	230	8.50	2.34
Mesa Verde Corr.	3	74	11	13	4		5	5	14				129	4.77	1.31
P II-P III Corr.	3				3	1	19	2		2	1	4	35	1.29	0.36
Chapin B/W												1	1	0.04	0.01
Fugitive Red		1							2				3	0.11	0.03
Chapin Gray	5	4		4					8			1	22	0.81	0.22
Moccasin Gray	1						1		1				3	0.11	0.03
Abajo R/O		1		1								2	4	0.15	0.04
Deadmans B/R			2					1	10				12	0.44	0.12
Piedra B/W	4	4	1				10		12				22	0.81	0.22
Cortez B/W	1								2			1	4	0.15	0.04
Mancos Gray	5	4				1	3		2			1	16	0.59	0.16
Mummy Lake Gray		1							1				2	0.07	0.02
Late Gray Wares	4	2											6	0.22	0.06
Mesa Verde B/W	1			3		1	1		2				8	0.30	0.08
Uncl. Corr.	933	938	484	281	340	35	442	131	581	23	87	96	4371		44.50
Unc. Plain Gray	513	143	99	168	41	11	119	18	328	4	14	45	1503		15.30
Uncl. White Ware	204	64	28	98	148	40	161	56	239	27	88	57	1210		12.32
Uncl. Red Ware	1	2	5	3	3		2		5			1	22		0.22
Tusayan Polychrome	5	22	11	2	6		87		19		2	2	158	5.84	1.61
Tusayan B/R	1	4		8		1	8	3	1		3		29	1.07	0.29
Medicine B/R							9						9	0.33	0.09
Uncl. Tsegi Orange		6			2	2	28	3			1		42	0.15	0.43
Flagstaff B/W		2					43						45	1.66	0.46
Sosi B/W	27										2		29	1.07	0.29
Wingate B/R				1							1		2	0.07	0.02
Puerco B/R	3			1					1				5	0.18	0.05
Gallup B/W							2						2	0.07	0.02
Tin Cup Polychrome											1		1	0.04	0.01
Unid. wares	3						5	2	1				11		0.11
TOTAL	2190	1444	777	766	753	161	1113	293	1659	99	265	302	9822		

chrome, Medicine Black-on-red and unclassifiable Tsegi Orange wares represent Tsegi Orange Ware. Flagstaff Black-on-white and Sosi Black-on-white (Fig. 16), represent Tusayan White Ware. Both of these are from the Kayenta Region in northern Arizona. Seventy-four percent of the trade ware sherds are Tsegi Orange Ware. Including the Tusayan White Ware types, the sherds from the Kayenta region account for 97 percent of the trade wares present at the site. Wingate Black-on-red and Puerco Black-on-red are White Mountain Red Ware from the Cibola Region in west-central Arizona and north central New Mexico are present in a very low frequency (seven sherds). Gallup Black-on-white from the Chaco Branch of the Cibola White Ware is present at the site, again in a low frequency (two sherds). One Tin Cup Polychrome sherd was present at the site. This is a regional "deviant" of the Mesa Verde White Ware Series occurring in the Montezuma Valley are of Cajon Mesa, Colorado (Washburn 1976:18-19).

Eighty-four percent of the trade ware from the site is from the original occupation levels. Fifteen percent is from the second occupation levels and one percent (three sherds) is from the one floor representing the third occupation level. These figures show a uniform percentage throughout the levels since the total number of sherds accountable to each of the three occupation levels varies similarly: the original occupation levels were well represented by sherds, the second occupation levels had fewer artifacts and fewer floors were identified, and there is only one third occupation floor level.

The three levels varied somewhat in the range of types present. As seen in Table 3 Tsegi Orange Ware, besides being the most abundant, was present in all three levels, represented by Tusayan Black-on-red. The low frequency encountered in the third

TABLE 3

NUMBERS OF TRADE WARE SHERDS PRESENT

IN THE OCCUPATION LEVELS

Trade Ware Types	First	Second	Third	Unassignable to levels
Tsegi Orange Ware				
Tusayan Polychrome	143	7		10
Tusayan B/R	23	5	1	
Medicine B/R	24			
Uncl. Tsegi Orange wares	39	1	2	
Tusayan White Ware				
Flagstaff B/W	30			
Sosi B/W		29		
White Mountain Red Ware				
Wingate B/R	1	2		
Puerco B/R	1	1		3
Chaco Branch, Cibola White Ware				
Gallup B/W	2			
Mesa Verde White Ware variant				
Tin Cup Polychrome		1		
Unidentified	8	1		1

occupation level, three sherds from Floor 1 in Room 9A, does not necessarily indicate a continuing trade of the Tusayan pottery but may reflect a reuse of sherds already present on the site. Tusayan White Ware is present in both the first and second occupation levels but represented by different types in this series. Sherds of White Mountain Red Ware are present in both the first and the second occupation levels but in very low frequencies. Tin Cup Polychrome is present only from the second occupation level indicating regional trade in the Montezuma Valley.

This data, despite the low frequencies, seems to indicate that trade had existed in the original occupation with the Kayenta Region, the Cibola Region, and the Chaco area. The second occupation apparently also obtained trade ware from the Kayenta Region and possibly from the Cibola Region. This level also shows evidence of local regional trade in the Montezuma Valley. As already indicated the evidence of the trade ware from the third occupation level may only represent a random reuse of sherds present at the site.

Twelve other sherds, apparently trade wares are possibly of a Southern origin. They have been examined at the Mesa Verde Research Center and at the Chaco Center, but have not yet been identified.

The ceramics encountered at the site are similar to ceramics reported at other Chaco outliers located in the vicinity. Martin (1936:79-80) reports from the Lowry Ruin the occurrence of Mesa Verde ceramics and an assemblage of trade wares which almost parallels the regional trade indicated at Escalante: Sunset Redware, Wingate Black-on-red, Abajo Red-on-orange, Black Mesa Black-on-white, Tusayan Black-on-white, Tusayan Black-on-red, Tusayan Polychrome, and Puerco Black-on-red. At the Chimney Rock site, Eddy (1972;VI-52) encountered a predominance of Mesa Verde ceramics and

1.91 percent occurrence of trade wares which included Tusayan Polychrome, Tusayan Black-on-red, Chaco Black-on-white and an unidentified red ware.

The trade wares encountered at Escalante and at the other two sites are the usual trade wares found at this time period in Chaco sites. Vivian and Mathews (1964:73-74) report that trade wares in Chaco sites are scarce in all periods, occurring in a low frequency, and that for Pueblo III the most frequently reported imports have been confined to the Wingate and Puerco Black-on-reds and the Tusayan-Citadel group.

Portions of 16 vessels were recovered from the deep trash layer above the grinding bins in Floor 2 of Room 20, an original occupation floor level. Some sherds from these vessels were also recovered from fill above the original floor levels in Rooms 9 and 20. Only one of the vessels was reconstructed. This is a Black-on-white bowl with a flared rim, described below. The other vessels include four Pueblo II-Pueblo III Corrugated jars, three McElmo Black-on-white bowls, two with corrugated exteriors, three Mancos Black-on-white bowls, one Tsegi red ware jar, one Flagstaff Black-on-white bowl, and one unidentified black-on-white bowl (Fig. 14). This thick trash layer contains 55.6 percent of the trade ware from the site, or 69 percent of the trade ware from the original occupation levels.

The preliminary ceramic analysis did not include a formal investigation of temper, paint, or design. Further investigations of this nature are recommended for the site. The design elements, though consistent with the types of the Mesa Verde Ceramic Series (Breternitz, et al. 1974) and classifiable into those types demonstrated a slight variation attributable to the spatial separation.

Figure 12: Reconstructed Mesa Verde Corrugated jar.

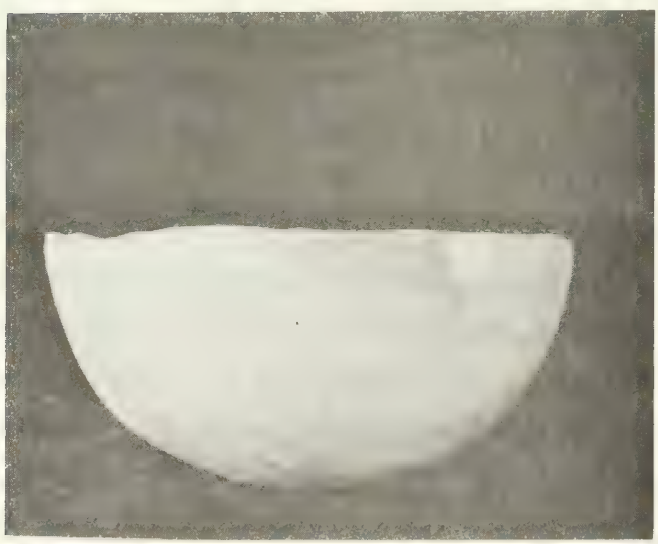


Figure 13: White ware bowl made from the base of a black-on-white jar.

Figure 14: Partial unidentified black-on-white bowl.

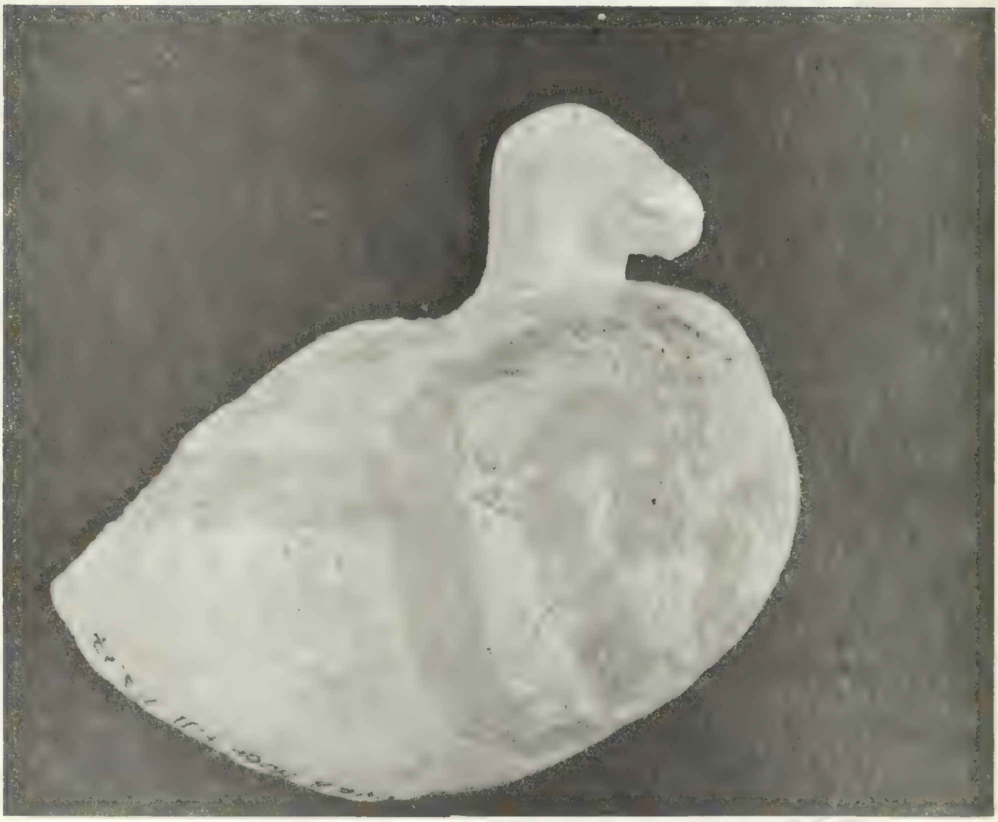


Figure 15: Mancos Black-on-white bird effigy jar.

Figure 16: Partial Sosi Black-on-white bowl.

Chipped Stone

There is a total of 1,002 chipped stone artifacts from the site, including the flakes, cores, and formal chipped stone tool types.

Materials. Five materials make up 98 percent of the collection. Over half is quartzite (Qe), chert (Ct) is the second highest in frequency, then obsidian (On), siltstone (SS), and chalcedony (Cy). Present in very low frequencies are felsite porphyry (FePy), sandstone (Se), limestone (Le), agate (Ae), and basalt (Bt). The frequency of these material types is shown in Table 14.

The quartzite tally actually includes three quartzite subtypes which are distinguished by grain size (Emslie 1975): quartzite (Qe), fine quarzite (fQe), and very fine quartzite (vfQe). The quarzites are metamorphosed rocks composed of quartz cemented by silica. Quartzite has coarse grains from 2 to 0.25 mm in diameter, appearing granular in texture. Fine quartzite has a "Sugary" appearance. The grains can be seen by the naked eye but the texture is less granular than the quartzite. The grains range from 0.25 to 0.125 mm in diameter. The very fine quartzite has very small grains ranging from 0.125 to 0.062 mm in diameter. The grains usually cannot be seen by the naked eye and the stone is silty in appearance.

This distinction was made only in the analysis from the second season, accounting for only one-third of the quartzite in the collection. However, from the second season's data it was found that the fine quartzite was the most abundant, 63 percent; quartzite was next, 31 percent; and very fine quartzite represented only 5 percent of the sample. The fine quartzite flakes show the

most frequent utilization (12); compared to quartzite (2) or very fine quartzite (1). Of the 15 cores, 12 were fine quartzite and 3 were quartzite.

All but four of the materials, obsidian, chalcedony, sandstone, and shale display river cobble cortex. Modern river cobble sources may have been from two places: the Dolores River located below the Escalante site, or the surface fill of the Escalante hill which is an ancient river terrace.

Of the 27 pieces of chalcedony, only two had cortex remaining and neither of these appeared to have been river tumbled. Although this material may be present in the river beds, it appears that another source was utilized.

The obsidian displays a cortex which is clearly not river rolled. There is no local source of obsidian so this material must have been obtained through trade or travel to a distant source. Two varieties of obsidian are distinguishable. One is very clear and gray to black in color depending on its thickness and contains some white sphericulites. The other type is also gray to black in color but the thin pieces are "milky" in appearance from many tiny inclusions. The former type is predominant. These two types of obsidian were also found in the excavations at Yellow Jacket (Wheat, personal communication).

Although the obsidian is present throughout the levels, 81 percent of the pieces accountable to occupation levels are associated with the original occupation. Ten percent (seven pieces), and nine percent (six pieces) are associated with the second and third occupation levels. This may indicate a reuse of the materials already present, or a reduced volume of the total number of artifacts present from the second and the third occupations.

TABLE 4

FLAKES, CORES, AND FORMAL CHIPPED STONE TOOLS
BY MATERIAL TYPES

Artifact type	Quartz-ite	Chert	Obsi-dian	Silt-stone	Chalce-dony	Felsite Porphyry	Shale	Sand-stone	Lime-stone	Agate	Basalt	TOTAL
Flakes, Primary cortex	10											10
Flakes, Secondary cortex	305	40	18	13	2	6	2		2	1	1	390
Flakes, Interior	251	115	77	41	15	1	1	4		1		507
TOTAL Flakes	566	155	95	54	17	7	3	4	2	2	1	907
Cores, Secondary cortex	43			6			1					50
Cores, Interior	6	2		1								9
TOTAL Cores	49	2		7			1					59
Projectile Points	1	7			6							14
Bifaces	3	4			3							10
Scrapers, Denticulate tools	3	6	1		1							11
Drills	1											1
TOTAL Tools	8	17	1		10							36
TOTAL	623	174	96	61	27	7	4	4	2	2	1	1002

TABLE 5

MATERIAL TYPES FOR FUNCTIONAL CATEGORIES OF UTILIZED FLAKES AND THE PERCENTAGES OF THE TOTAL NUMBER OF FLAKES WHICH ARE UTILIZED FOR EACH MATERIAL

Functional categories	Quartzite	Obsidian	Chert	Chalcedony	Limestone	Siltstone	Shale	TOTALS
Scraper use	16^{2}	15^{5}	18^{4}	1	1		1	52
Knife use	8^{1}	17^{5}	9^{4}	1^{1}				35
Scraper and Knife use	1	4	2					7
Rejuvination	13							13
Chopper use	6							6
Hammer use	2		1		1			4
Miscellaneous	1					1		2
TOTAL	47	36	30	2	2	1	1	119
% of flakes utilized	8.3	37.9	19.4	11.7	100.0	1.8	33.3	
% of material utilized	8.5	39.6	27.0	44.4	100.0	1.7	33.3	

Superscripts indicate the number of flakes which show multiple side and/or end use.

TABLE 6

PROVENIENCE AND DESCRIPTION FOR PROJECTILE POINTS, DRILLS, AND BLANKS

Type	Field number	Provenience	Material	Length	Width	Thickness	Figure number*	Function
small,	26	Kiva A, Floor Vault	Cy	2.60	1.33	0.28	a	knife, projectile point
side notched,	7	Room 2, Floor 1 F.A.13	Ct	2.65	1.45	0.30	b	projectile point
square tangs	13	Room 5, Floor 1 fill	Ct	2.57	1.18	0.28	c	drill
	30	Room 6, Floor 2 fill	Cy	2.40	1.20	0.26	d	projectile point
	212	Room 10, Level 8	Ct	2.40	1.10	0.25	e	drill
	237	Room 9, Floor 3 fill	Ct	2.50	0.50	0.20	f	drill
longer,	15	Room 5, Subfloor 1 fill	Cy	3.05	1.20	0.30	g	drill and knife
side notched,	34	Room 8, Floor 1 F.A.30	Cy	3.30	1.05	0.35	h	drill and knife
square tangs								
dart point	20	Room 6, Floor 1 fill	Ct	4.90	1.75	0.55	m	scraper, projectile point
Blanks	4	Kiva A, Bench F.A.5	Cy	2.50	1.30	0.30	i	knife
	5	Kiva A, Floor F.A.9	Ct	3.90	1.70	0.50	j	not used
	5	Kiva A, Floor F.A.12	Ct	2.80	1.75	0.40	k	not used
	10	Room 2, Floor 1 fill	Ct	2.81	1.65	0.50		not used
	288	Room 20, Floor 2 fill	Ct	2.0	1.70	0.30	l	gouge, knife
Assymetrical	5	Kiva A, Floor F.A.7	Qe	3.20	1.25	0.60	n	drill

* Figure 63

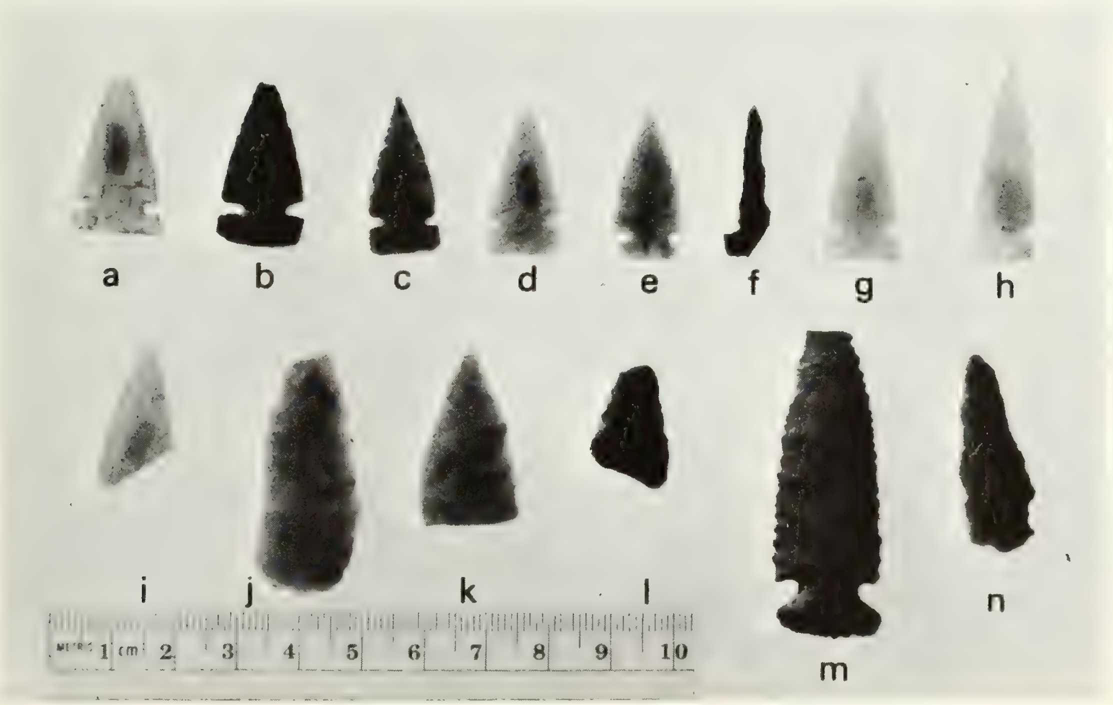


Figure 17: Projectile points, drills, and blanks: a,b,d, Small, side notched, square tanged points; c, e-h,n, Drills; j,k, Blanks; a,g,h,i,l, Knife use.

Utilized flakes. The flakes showing use but which are unmodified in shape are separated into functional categories. Table 5 shows the breakdown of the categories of the functional types according to the material. Ratios are also given in the second to the last row of the table for the number of utilized flakes to the total number of flakes in the collection for each material. Although quartzite flakes are the most frequently utilized, quartzite represents a low percentage of utilization. Obsidian, chert, and chalcedony show higher utilization compared to the total number of flakes of these materials. The final percentage column indicates this material selection more graphically. The percentages are tabulated including the formal tool types with the utilized flakes and then divided by the total amount of chipped stone, including flakes and cores.

Formal Chipped Stone Tool Types

Projectile points, drills, and blanks. Within the morphological grouping of the small shaped hafted points a variety of functions for the artifacts were indicated by wear. Table 6 gives their proveniences and description, and the artifacts are illustrated in Figure 17.

Bifaces. This group includes large bifacially formed tools, or fragments of these tools, which have been utilized as knives (Table 7 and Fig. 18).

End and side scrapers. The end or side scraper is defined by an edge with a steep unifacial bevel produced by pressure flaking and located on either the end or side of the flake. All six of these scrapers are combination end and side scrapers (Table 8). On each tool the end has the most prominent use edge, a steep edge

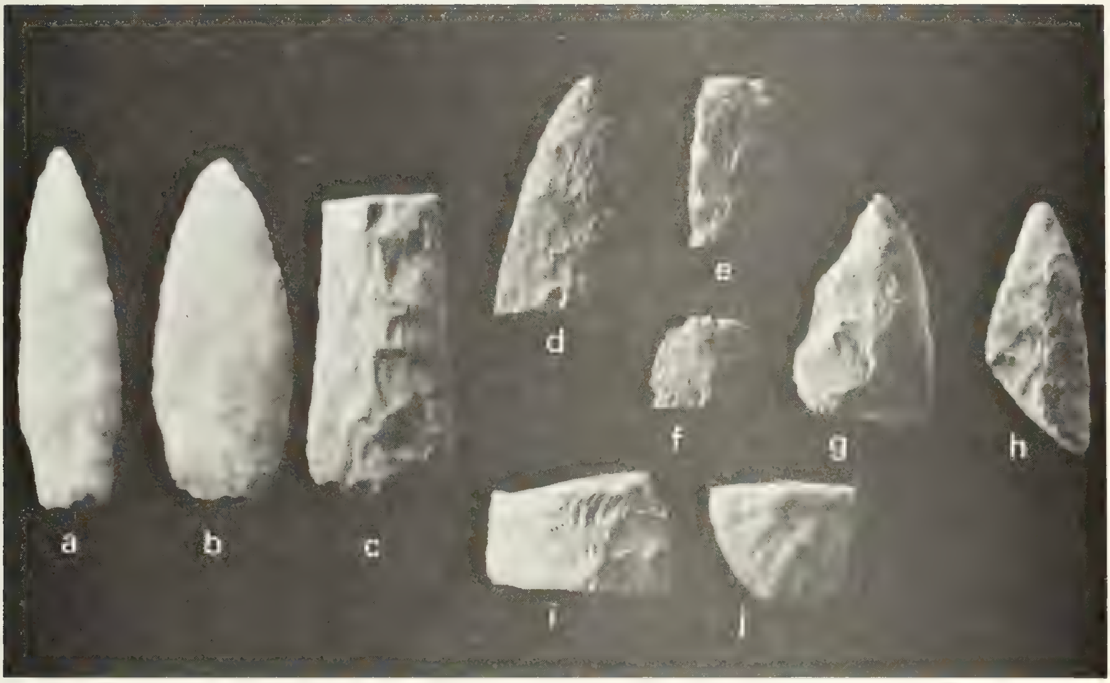


Figure 18: The biface tools: a, Stemmed biface; b, Leaf-shaped biface; c-f, Fragmentary; g, Assymetrical stemless biface; h-j, Fragmentary.

TABLE 7

PROVENIENCE AND DESCRIPTION OF BIFACES

Field number	Provenience	Fragment	Material	Length	Width	Thickness	Figure number*	Comments
6	Room 2, Fill	x	Cy	4.3	2.7	0.5	e	hafted, base ground
33	Room 8, Floor 1 fill	x	Ct	2.6	2.4	0.5	f	
33	Room 8, Floor 1 fill		Ct	9.25	2.75	0.65	a	stemmed, tip used to perforated
8	Room 5, Fill		Ct	8.7	3.7	0.6	b	leaf shaped
11	Room 5, Floor 1 fill	x	Ct	6.5	2.7	0.5	h	tip used as gouge
11	Room 5, Floor 1 fill	x	Qe	7.8	3.7	0.7	c	base slightly rounded
13	Room 5, Floor 1 fill		Qe	5.7	3.7	1.0	g	scraper use at base, tip used as gouge
15	Room 5, Subfloor 1 fill	x	Ct	6.0	3.6	0.7	d	
41	Room 9, Floor 3	x	Cy	3.2	3.8	0.5	j	scraper use
1	Surface	x	Qe	3.0	4.7	0.8	i	

* Figure 64

with a convex outline. The edges display exhausted end scraper wear: the steeply retouched edge is sharply undercut through use by multiple step fractures and the bottom edge shows grinding. This type of wear is described by Wilmsen (1970:71-76) as the wear typical of scrapers used as hide scrapers by Eskimo Indians. These tools could nave been used for similar tasks.

Two other edges on each scraper also have been utilized, the use commonly occurring on the two opposing sides. Eight of the twelve edges have been retouched to form a beveled edge. These edges are straight or concave in outline and show heavy to moderate wear. The other four edges show scraper wear but little or no retouch.

Denticulate edged tools. Six tools from the site display notching along one or more edges to form a denticulate edge (Table 9).

Denticulate edged tools have been reported from Mesa Verde by Rohn (1971:219) and O'Bryan (1950:79-80, Pl. XXVII), from Alkali Ridge by Brew (1946:241, Fig 171), and from Kin Kletso in Chaco Canyon (Vivian and Mathews 1966:89-90, Fig 50). These tools are designated as saws and display no secondary flaking of the surface.

The same type of tool is present in the Yellow Jacket area from Pueblo II and Pueblo III sites (Wheat, personal communication). The notched edge is present on flakes with no secondary flaking and on bifacially shaped blades.

Chopping and Pounding Tools

Axes. A total of eight axes were recovered from the excavations. Two of the axes are side-notched. One, in the process of

TABLE 8

PROVENIENCE AND DESCRIPTION FOR END AND SIDE SCRAPERS

Field number	Provenience	Material	Length	Width	Thickness	Figure number*	Scraper use on sides
11	Room 5, Floor 1 fill	Ct	2.2	2.1	0.7	d	two, both beveled
11	Room 5, Floor 1 fill	Ct	2.6	2.5	0.6	c	one, beveled
11	Room 5, Floor 1 fill	Ct	5.5	2.7	1.2	b	two, both concave, one beveled
9	Room 5, Floor 1 F.A.5	Ob	3.9	3.4	1.05	a	two, both beveled, one concave
27	Room 8, Level 2 fill	Cy	2.4	2.2	0.8	e	three, all retouched
22	Room 6, Floor 1 F.A.38	Ct	3.8	2.7	1.1		two, both beveled

* Figure 65

TABLE 9

PROVENIENCE AND DESCRIPTION FOR DENTICULATE EDGED SCRAPERS

Field number	Provenience	Material	Length	Width	Thickness	Figure Number*	Notches+	Comments
5	Kiva A, Floor F.A.31	Qe	5.6	3.7	0.7		4,1,1,1	
6	Room 2, Fill	Ct	4.5	3.4	0.9	c	6	secondary flaking, scraper use on 2 other edges, knife use on 1 other edge
33	Room 8, Floor 1 fill	Cy	3.8	2.8	0.9		3	bifacial thinning, scraper use 1 other edge
30	Room 6, Floor 2 fill	Qe	6.1	3.8	0.8	a	5	
1	Surface	Ct	5.7	4.5	0.8	b	9,6	scraper use two other edges
1	Surface	Cy	4.1	3.1	1.0		2,2,1	scraper use 1 other edge

* Figure 66
\+ More than one entry indicates number of notches on different edges

manufacture, is unutilized the second is fragmented. The remaining six axes are grooved.

Table 10 gives the proveniences and description for these artifacts. Seven of the axes are shown in Figure 19.

Mauls. A maul is designated here as a very large hafted stone tool used for pounding. Only two specimens were found. Both of these are unshaped except for the hafting modification, and they show little use.

Choppers. A chopper has an edge which has been formed by removing percussion flakes unifacially or from alternating faces of a single edge. The tool, which is hand held, is used to cut by blows, rather than by slicing. The resulting wear is a series of step fractures and battering along the edge.

The descriptive information for these tools is given in Table 11.

Hammerstones. Hammerstones are hand held pounders which may have been used for many purposes including striking flakes from cores, shaping building stone, and processing bone and plant material. The greatest number of hammerstones are cores left over from the production of flakes. Four flakes demonstrated use as hammerstones. In addition four of the hammerstones found are river cobbles displaying intentional percussion flake removal on an edge to form the surface and subsequent battering wear. A fifth river cobble which displays no modification had also been used as a hammerstone. Table 12 give the provenience and descriptions for these tools.

TABLE 10

PROVENIENCE AND DESCRIPTION FOR AXES, HAMMERS, AND MAULS

Type	Field number	Provenience	Material	Length	Width	Thickness	Haft type+	Hammer reuse	Figure number
Axes	3	Kiva A, fill	Qe	11.0	6.7	5.0	G		67f
	25	Kiva A, Ventilator tunnel	Qe	13.0	7.2	3.9	½G		67d
	33	Room 8, Floor 1 fill	Qe	9.3	8.2	2.3	N		-
	160	Room 10, Floor 2 F.A.1	Qe	11.2	6.7	3.9	G	x	67e
	160	Room 10, Floor 2 F.A.4	Qe	8.3	6.1	3.3	G	x	67g
	160	Room 10, Floor 1 fill	Qe	12.9	5.9	4.7	G		67b
	118	Room 9A, Floor 1 F.A.11	FePy	17.5	8.0	2.8	N		67c
	309	Room 19, South exterior	Qe	11.6	7.8	4.5	G	x	67a
Flake from axe bit	258	Room 20, Level 4	fQe	4.5	3.7	1.1			
Hammers	7	Room 2, Floor 1 F.A.26	Qe	8.6	6.2	4.4	G		68
	33	Room 8, Floor 1 fill	Qe	10.5	6.2	4.3	G		-
Mauls	45	Kiva A, Pilaster 5	Qe	15.1	12.3	7.7	G		69a
	21	Unknown	Qe	29.5	15.0	10.5	N		69b

+ G = Grooved, N+ Notched

Figure 19: Stone axe heads

Figure 20: Stone hammer head from Floor 1 of Room 2.

TABLE 11

PROVENIENCE AND DESCRIPTION FOR COBBLES, FLAKES AND CORES USED AS CHOPPERS

Type	Field number	Provenience	Mate-rial	Length	Width	Thick-ness	Hammerstone use also
Cobbles	5	Kiva A, Floor F.A.11	Qe	11.2	9.0	5.0	
	5	Kiva A, Floor F.A.29	Qe	9.9	8.0	5.2	
	6	Room 2, Fill	Qe	6.7	5.1	2.9	
	33	Room 8, Floor 1 fill	Qe	10.6	8.2	6.7	
	33	Room 8, Floor 1 fill	Qe	4.5	3.8	1.8	
Flakes	5	Kiva A, Floor F.A.38	Qe	5.3	3.9	2.0	
	26	Kiva A, Floor vault	Qe	5.5	4.7	1.5	
	10	Room 2, Floor fill	Qe				
	14	Room 5, Subfloor 1 fill	Qe	5.6	7.7	4.2	
	18	Room 6, Fill	Qe	8.9	10.4	4.5	
	1	Surface	Qe	6.0	5.0	1.7	
Cores	12	Kiva A, Fill below bench	Qe	15.9	8.4	7.8	
	13	Room 5, Floor 1 fill	Qe	10.4	8.4	4.8	
	19	Room 8, Fill	Qe	8.7	8.4	7.2	
	33	Room 8, Floor 1 fill	Qe	12.9	9.0	5.2	
	216	Room 20, Level 5	Qe	9.1	6.6	6.5	x
	20	Room 6, Floor 1 fill	Qe	6.0	5.2	2.7	
	24	Room 6, Subfloor 1 fill	Qe	6.2	5.5	3.2	
	24	Room 6, Subfloor 1 fill	Qe	7.5	6.4	5.4	
	30	Room 6, Floor 2 fill	Qe	7.8	4.6	5.5	
	226	Room 9, Level 4	Qe	10.4	6.1	2.9	
	63	Room 9A, Floor 1 fill	Qe	9.3	8.6	4.4	x

TABLE 12

PROVENIENCE AND DESCRIPTION FOR COBBLES, FLAKES AND CORES USED AS HAMMERSTONES

Type	Field number	Provenience	Material	Length	Width	Thickness	Chopper use also
Cobbles	26	Kiva A, Floor vault	Qe	6.4	5.3	3.6	
	6	Room 2, Fill	Qe	8.8	7.3	4.0	
	33	Room 8, Floor 1 fill	Qe	9.0	7.7	4.9	
	31	Room 6, Floor 2 F.A.29	FePy	8.1	6.1	4.8	
	37	Room 9, Fill	Qe	11.4	10.4	6.0	
Flakes	11	Room 5, Floor 1 fill	Ct	5.4	2.7	1.3	
	9	Room 5, Floor 1 F.A.1	Qe	6.9	4.2	1.2	
	41	Room 9, Floor 1 F.A.24	Le	10.4	6.6	3.1	
	214	Room 20, Level 8	Qe	3.4	2.3	1.0	
Cores	25	Kiva A, Ventilator tunnel	Qe	8.1	5.3	5.1	
	7	Room 2, Floor 1 F.A.23	Qe	6.6	5.7	3.8	
	7	Room 2, Floor 1 F.A.23	Qe	8.3	7.2	5.6	
	14	Room 5, Subfloor 1 fill	Qe	7.7	6.3	5.7	
	18	Room 6, Fill	Qe	6.0	5.8	3.2	
	24	Room 6, Subfloor 1 fill	Qe	6.7	6.5	5.5	
	24	Room 6, Subfloor 1 fill	Qe	7.0	6.5	3.6	
	24	Room 6, Subfloor 1 fill	Qe	7.5	6.4	5.4	x
	31	Room 6, Floor 2 F.A.5	Qe	12.0	11.9	7.2	
	31	Room 6, Floor 2 F.A.45	Ct	5.2	4.0	2.7	
	33	Room 8, Floor 1 fill	Qe	6.6	5.0	4.8	
	33	Room 8, Floor 1 fill	Qe	9.0	6.0	4.0	

TABLE 12 (CONTINUED)

Type	Field Number	Provenience	Material	Length	Width	Thickness	Chopper Use Also
Cores (Continued)	33	Room 8, Floor 1 fill	Qe	6.5	6.5	3.0	
	80	Room 10, Level 4	SS	8.8	5.2	3.6	
	113	Room 10, Floor 1 fill	Qe	6.9	6.7	4.1	
	186	Room 10, Level 7	SS	8.0	6.9	2.9	
	186	Room 10, Level 7	Qe	7.6	6.8	5.6	
	214	Room 10, Level 8	Qe	9.2	7.0	6.1	
	214	Room 10, Level 8	Qe	10.0	7.7	3.9	
	206	Room 10, Subfloor 2	Qe	6.1	5.0	4.1	
	195	Room 10, Floor 2 F.A.16	Qe	6.8	5.6	3.7	
	195	Room 10, Floor 2 F.A.16	Qe	8.5	5.1	3.5	
	261	Room 20, Level 5	Qe	9.1	6.6	6.5	x
	63	Room 9A, Floor 1 fill	Qe	9.3	8.6	4.4	x

Grinding and Polishing Stones

Metates. A total of eighteen metates, twelve of which are complete is the slab metate, although there are two basin and one troughed metates as well. The two basin metates were both incorporated into the wall as building stones. Provenience and description for these artifacts is given in Table 13.

Manos. There are a total of 86 manos, 33 complete, and 53 fragmentary. Sandstone is the predominant material used for the manos (52), but quartzite (23), conglomerates (10), and felsite prophyry (1) are also used. River cobbles had been used for six of the manos.

The manos are classified into groups (based on Rohn 1971: 203-207) according to individual attributes including lateral and horizontal cross-sections and the number of grinding surfaces. The lateral cross-sections are flat (F), concave (Ce) or convex (C), forms resulting from the reciprocal movement across a metate. In addition some are designated (F&C) or (F&Cv) if two grinding surfaces on a single mano have different lateral cross-sections. The horizontal cross-sections are slab (S) with the front and back faces almost parallel; humped (H) with a low hump or dome shape; or airfoil (A), a triangular form. The grinding surfaces have been designated as unifacial (U) if they had been used on one face, and bifacial (B) if they had been used on both faces. The number of grinding surfaces is indicated by numbers: (1), (2), or (3). Although it is possible to have two grinding surfaces on a single face, none of the unifacial manos demonstrated this, and only two bifacial manos (B3) had two grinding surfaces on one face, with one on the other face.

TABLE 13

PROVENIENCE AND DESCRIPTION OF SLAB, TROUGHED, AND BASIN SHAPED METATES

Type	Field Number	Provenience	Fragment	Material	Length	Width	Thickness	Shape*	Comments
Slab	26	Kiva A, Floor Vault		SS	49.0	29.5	8.0	S	
	298	Kiva B, Fill		cgSS	51.0	32.0	13.5	O	
	6	Room 2, Fill		SS	46.0	29.0	6.0	R	
	6	Room 2, Fill		SS	43.0	27.0	7.0	R	cobble
	6	Room 2, Fill		Con	46.0	26.0	7.5	S	
	6	Room 2, Fill	x	Con	23.0	23.0	8.0	O	
	27	Room 8, Subfloor 2 Fill	x	SS	27.0	20.0	7.5	O	
	27	Room 8, Subfloor 2 Fill		SS	48.0	29.5	16.0	R	cobble
		Rooms 8 and 10, Door		SS	54.0	32.0	8.0	R	
	180	Room 10, Level 6		cgSS	43.0	28.0	15.1	R	concave grinding surface
	18	Room 6, Fill		SS	43.5	25.5	9.0	R	cobble
	39	Room 9, Subfloor 2 Fill	x	SS	22.0	25.0	6.5	O	
	252	Room 20, Level 5		SS	47.0	22.0	9.0	R	
	118	Room 9A, Floor 1 F.A.45		cgSS	34.0	27.0	13.0	R	cobble
	21	Unknown		SS	47.0	28.5	10.0	R	blank
Troughed	91	Room 10, Floor 1 Fill	x	SS	25.8	21.8	8.61	O	
Basin	38	Kiva A, Wall		SS	26.0	25.0	20.0	Sq	cobble
	28	Room 2, Wall	x	SS	29.0	25.0	6.6	O	

*S = Sub-rectangular
R = Rectangular
O = Ovate
Sq = Square

The classification of these manos resulted in thirteen styles. Table 14 presents the styles and number of each type for the classifiable artifacts. One style, CAbc, represented by only one artifact, is indicated in the Convex Bifacial Airfoil category as a superscript.

Table 15 gives provenience, measurements and the attribute categorization for the individual manor. In addition the plan view shape and the presence of finger grooves is indicated. Five of the manos display use as a work surface. Four retain traces of pigments on a small area of a face, all but one of these on the face opposite the grinding surface. The fifth mano retains evidence of use as a work surface but no pigment was apparent on this surface.

Grinding stones. This category includes 33 stones, all river cobbles, which have been used to rub or grind against another surface. All of the stones exhibit polish on at least one surface, which may be accompanied by unidirectional or multidirectional striations. Thirteen of the stones, 40 percent, have been used on more than one surface, including the other face, sides, ends or edges. Only six of the stones show any shaping, the rest being unmodified. On two of these the shaping produced finger grooves. The size of the stones vary between 17.5 to 3.5 cm in length, 12.9 to 3.2 cm in width and 11.8 to 0.7 cm in thickness. Table 16 gives the provenience and descriptions for these stones.

Four of the stones also have battering on an end. Woodbury (1954:88) isolates a category of artifacts from sites in northeast Arizona, which he calls pounding and rubbing stones: stones with a flat surface, striated or polished, combined with pounding (battering) use on the end.

TABLE 14

NUMBERS OF MANOS REPRESENTED BY ATTRIBUTE COMBINATIONS

Lateral Cross Sections	Grinding Surfaces	Slab	Air Foil	Humped
Flat	Unifacial	18	9	12
	Bifacial	5	9	2
Convex	Unifacial	3		
	Bifacial		5[1]	
Flat & Convex	Bifacial	1	4	2
Flat & Convex	Bifacial	1		

[1]One bifacial with three grinding surfaces

TABLE 15

PROVENIENCE AND DESCRIPTION OF MANOS

Field Number	Provenience	Frag-ment	Style*	Material	Length	Width	Thick-ness	Plan Shape*	Finger Grooves	Comments
3	Kiva A, Fill		FSul	Qe	24.6	12.5	3.8	R	x	
3	Kiva A, Fill	x	FAb2	Qe	13.0	13.0	4.0	R		
3	Kiva A, Fill	x	FHul	Con	-	-	-	SR		
12	Kiva A, Below bench fill	x	--ul	Con	11.0	8.0	6.0	-		
17	Kiva A, Floor fill	x	FAul	Se	12.5	10.0	2.0	SR		
26	Kiva A, Floor vault		FSb2	Con	22.5	12.0	2.0	0	x	
26	Kiva A, Floor vault		FAul	Qe	23.5	12.5	2.5	R	x	
26	Kiva A, Floor vault		FSul	Qe	25.8	13.1	3.5	SR		
26	Kiva A, Floor vault	x	F&Ce,Sb2	Se	15.5	9.5	2.7	R		
26	Kiva A, Floor vault	x	FSb2	Qe	9.5	11.5	4.5	0		
25	Kiva A, Ventilator tunnel	x	FSul	Se	15.0	12.0	2.0	R		
25	Kiva A, Ventilator tunnel	x	FAul	Con	21.0	12.5	5.0	SR		limonite
47	Kiva A, Pilaster 8	x	F&C,Sb2	Se	10.0	5.1	2.5	-		
92	Kiva B, Level 2	x	FHb2	Se	9.3	12.0	4.4	-		
92	Kiva B, Level 2	x	FAb2	SS/RC	7.0	8.6	3.5	0		
97	Kiva B, Level 2		CSul	Se	24.5	12.3	2.8	SR		Anvil use
297	Kiva B, Fill		FSul	Se	26.3	1217	4.2	R		
6	Room 2, Fill		FSul	SS/RC	24.0	12.1	3.8	0		hematite
6	Room 2, Fill	x	FHul	Con	14.6	11.6	6.8	R		
6	Room 2, Fill	x	FAul	Con	24.4	12.0	3.3	R		
6	Room 2, Fill	x	CAb2	Se	18.2	9.6	2.9	0		
10	Room 2, Floor fill		FHul	Qe	22.5	11.4	4.5	R		
10	Room 2, Floor fill		FHul	Qe	24.0	11.0	4.5	0	x	
10	Room 2, Floor fill	x	FAb2	Qe	11.5	10.5	2.0	R		
10	Room 2, Floor fill	x	--ul	Qe	6.5	4.0	2.5	0		

TABLE 15 (CONTINUED)

Field Number	Provenience	Fragment	Style^{+}	Material	Length	Width	Thickness	Plan Shape*	Finger Grooves	Comments
7	Room 2, Floor 1 F.A.13		FSu1	Qe	23.5	12.5	1.5	R	x	
7	Room 2, Floor 1 F.A.43		FAb2	Qe	26.0	10.7	1.8	0		hematite
19	Room 8, Fill		FSu1	Qe	20.0	12.0	3.5	R		
19	Room 8, Fill		FAu1	Con	22.0	12.0	4.0	SR		
27	Room 8, Subfloor 2fill	x	-Hb3	Qe	9.0	11.7	0.9	-		
33	Room 8, Floor 1 fill	x	FSu1	Se	10.7	10.5	3.0	R		
34	Room 8, Floor 1 F.A.29		FSb2	Se	26.8	12.8	3.1	SR		
34	Room 8, Floor 1 F.A.31	x	FSb2	Se	12.7	12.0	1.9	0		
34	Room 8, Floor 1 F.A.34	x	FAu1	Se	12.7	11.9	1.6	SR		
172	Room 10, Level 6	x	FHb2	Se	11.4	10.6	1.7	SR		
174	Room 10, Level 6		FHu1	SS/RC	24.2	11.0	3.4	0		
190	Room 10, Level 7	x	FAb2	Se	15.2	10.0	1.8	R		
190	Room 10, Level 7	x	-Ab2	Se	7.4	7.0	2.3	-		
190	Room 10, Level 7	x	-Ab2	Se	5.7	7.0	2.4	-		
190	Room 10, Level 7	x	-Hb2	Se	7.0	6.9	2.7	-		
190	Room 10, Level 7	x	F&C, Ab2	Se	14.1	12.1	2.1	R		
190	Room 10, Level 7	x	FAb2	Se	10.2	10.3	2.6	-		
190	Room 10, Level 7	x	-Hb2	Se	13.1	9.1	2.3	-		
190	Room 10, Level 7	x	F&C, Ab2	Se	11.1	10.8	2.6	0	x	
190	Room 10, Level 7	x	FAb2	Se	9.6	12.0	2.3	SR		
190	Room 10, Level 7	x	CAb2	Se	12.1	10.3	2.5	SR	x	
190	Room 10, Level 7	x	F&C, Ab2	Se	7.1	6.5	2.8	-		
190	Room 10, Level 7	x	-Hb2	Se	7.3	4.2	2.3	-		
190	Room 10, Level 7	x	CAb2	Se	10.7	12.0	2.6	SR		
196	Room 10, Level 8		CSu1	Se	26.0	13.5	3.7	R		
212	Room 10, Level 8		F&C, Hb2	Se	13.9	8.5	3.3	R		trough use

TABLE 15 (CONTINUED)

Field Number	Provenience	Fragment	Style+	Material	Length	Width	Thickness	Plan Shape*	Finger Grooves	Comments
215	Room 10, Level 8	x	FHul	Se	11.5	10.0	1.8	-		
215	Room 10, Level 8	x	F&C,Ab2	Se	14.5	11.9	4.1	O		
160	Room 10, West pit, Fea.2		CAb2	Se/RC	24.4	11.1	3.2	O		
277	Room 20, North wall door	x	FAul	Se/RC	16.0	11.5	2.7	O	x	
292	Room 20, Floor 2 F.A.11	x	FHul	FePy/RC	11.6	13.3	5.6	SR		
318	Room 20, Subfloor 2 pit	x	FSul	Se	8.5	11.7	1.8	R		
8	Room 5, Fill		FSul	Qe	29.6	13.4	3.8	R		
8	Room 5, Fill		-S-1	Qe	24.0	12.0	5.0	O		blank
8	Room 5, Fill		FAul	Se	25.0	11.5	1.7	SR		
14	Room 5, Subfloor 1	x	FSul	Qe	19.0	12.0	3.0	R	x	limonite and hematite
14	Room 5, Subfloor 1	x	FSul	Con	12.5	18.0	4.5	R		
14	Room 5, Subfloor 1	x	F&C, Ab2	Se	9.6	9.4	2.6	R		
14	Room 5, Subfloor 1	X	--b2	Se	4.9	1.4	1.0	-		
24	Room 6, Subfloor 1 fill		FSul	Se	22.1	12.8	3.5	R		
24	Room 6, Subfloor 1 fill		FHul	Qe	21.0	11.8	2.5	O	x	
24	Room 6, Subfloor 1 fill		FSul	Con	30.0	12.0	5.0	R	x	
24	Room 6, Subfloor 1 fill		FSul	Se	23.9	12.5	3.0	R	x	
24	Room 6, Subfloor 1 fill		FSul	Se	23.5	12.5	2.0	R		
24	Room 6, Subfloor 1 fill	x	-Ab2	Se	5.0	10.5	2.0	-		
24	Room 6, Subfloor 1 fill		FAb2	Se	23.2	13.0	1.5	R	x	
39	Room 9, Subfloor 2		FHul	Qe	30.0	15.0	5.0	SR		
39	Room 9, Subfloor 2		FSul	Qe	25.0	11.5	4.0	R		
143	Room 9A, Floor 1 fill	x	FHul	Se	8.6	8.5	3.7	-		
143	Room 9A, Floor 1 fill	x	CAb2	Se	13.7	11.6	2.9	SR		
118	Room 9A, Floor 1 F.A.42		FHul	Se	24.5	13.0	4.5	SR	x	

TABLE 15 (CONTINUED)

Field Number	Provenience	Frag- ment	Style+	Material	Length	Width	Thick- ness	Plan Shape*	Finger Grooves	Comments
82	Room 12, Interior trench		CSul	Se	27.0	13.1	5.6	R		
173	Room 15, Interior trench	x	FAul	Se	10.1	12.7	1.1	R		
173	Room 15, Interior trench	x	FSb2	Se	-	-	-	SR		
50	Room 19, North wall trench	x	--b2	Qe	11.8	11.2	3.2	-		
1	Surface	x	FAb2	Qe	11.2	12.4	4.5	R	x	
1	Surface	x	FHul	Qe	5.5	10.5	3.0	0		
1	Surface	x	--ul	Qe	8.5	6.0	2.5	SR		
21	Unknown		FSul	Con	25.0	12.0	2.6	R		
21	Unknown	x	-S-1	Se	26.5	12.5	2.5	R		blank
1	Unknown			Se	11.9	9.7	5.0	0		bisquit mano

+ after Rohn 1971
* 0 = oval, R= Rectangular, SR = Subrectangular

TABLE 16

PROVENIENCE AND DESCRIPTION OF GRINDING STONES

Field Number	Provenience	Fragment	Material	Length	Width	Thickness	Surfaces Used*	Striation Direction	Comments
3	Kiva A, Fill	x	Se	13.6	10.8	4.3	1	one	2 sides chipped
12	Kiva A, Below bench fill		Con	15.6	14.6	4.2	1		2 finger grooves
17	Kiva A, Floor fill		Qe	10.0	9.7	4.0	1		random flake scars
25	Kiva A, Ventilator tunnel		Se	13.5	12.9	5.2	1	multi	
26	Kiva A, Floor vault	x	Se	12.2	6.4	1.4	1		finger groove or spalling
5	Kiva A, Floor F.A.50	x	Qe	6.7	10.1	3.8	2		split to shape, end battered
10	Room 2, Floor fill	x	Qe	10.1	9.6	6.0	1		
190	Room 10, Level 7		fgSe	5.3	4.5	2.1	1		
194	Room 10, Level 7		QeSe	11.1	8.1	11.8	all	one	
202	Room 10, Level 8	x	QeSe	7.9	5.8	1.9	2		
207	Room 10, Level 8	x	QeSe	7.5	7.3	6.1	1		
252	Room 20, Level 2		QeSe	3.6	3.5	1.1	all	multi	
248	Room 20, Level 3	x	QeSe	6.5	3.3	3.1	1	one	
295	Room 20, Floor 2 fill		FePy	5.0	6.5	1.9	2,& 2 sides		
8	Room 5, Fill	x	Qe	17.5	11.1	5.3	1	one	
14	Room 5, Subfloor 1 fill	x	Qe	6.6	5.6	2.6	1	multi	
18	Room 6, Fill		Qe	10.0	8.7	3.7	2		spalling on ends & edges, battering on end
20	Room 6, Floor 1 fill		Qe	10.6	7.3	3.2	1		
23	Room 6, Floor 1 firepit	x	FePy	10.1	9.4	4.5	1	one	
222	Room 9, Floor 2		QeSe	3.5	3.2	1.0	all		
234	Room 9, Subfloor 3 fill		QeSe	6.0	3.5	1.1	all		
234	Room 9, Subfloor 3 fill		FePy	8.2	6.5	2.5	1		

TABLE 16 (CONTINUED)

Field Number	Provenience	Fragment	Material	Length	Width	Thickness	Surfaces Used*	Striation Direction	Comments
234	Room 9, Subfloor 3 fill		QeSe	3.6	2.9	0.7	2,sides, 1 end		
150	Room 9A, Floor 1, Fea. 2		QeSe	7.3	4.1	3.8	2		
311	Room 13, South wall		QeSe	7.1	3.4	1.9	all	one	
50	Room 19, North wall	x	Qe	10.7	10.1	3.6	1		
50	Room 19, North wall	x	Qe	9.6	8.7	5.6	2,1 side		
289	Room 19, East wall		QeSe	6.6	5.1	1.1	1		
289	Room 19, East wall		QeSe	4.5	2.9	2.5	1	one	
289	Room 19, East wall		QeSe	10.8	8.7	2.0	2,1 edge	one	
28	Wall		Se	14.1	10.0	5.8	1	multi	spalling
2	Unknown	x	Qe	9.1	6.5	5.4	1	multi	battered end
1	Surface		Qe	10.0	8.8	6.6	1		battered end

* Refers to number of faces used unless otherwise specified

Polishing Pebbles. This category includes twelve river rolled pebbles domonstrating polish on one or more sides. The polish is, in a few cases, accompanied by unidirectional or multidirectional striations. The distinction between the polishing pebble and the grinding stones, which are both used to rub against other objects, is based primarily on size and by a high glossy polish present on the polishing pebbles. Table 17 gives the provenience and descriptions for these artifacts.

Anvils. Anvils are large stones used as work surfaces. All but one of the twelve anvils are river cobbles and two-thirds of these had been used with no further modification. One is a shaped sandstone slab. Most of the anvils had been used on only one face: where both faces had been utilized (2 cases), one face shows predominant use. The wear consists of a polished area, accompanied on some stones by unidirectional striation or pecking. Table 18 gives the provenience and descriptions for the anvils.

Grooved Stones. This grouping includes stones with grooves formed on a surface. By their size and form, indicative of active or passive abrading use, they have been placed into two categories, following Woodbury (1954:101-111): simple grooved abraders and elongated shaftsmoothers. Table 19 gives the provenience and description for these artifacts.

Worked Sandstone Slabs. The worked sandstone slabs are flat slabs, fractured along the natural plane of the stone, and chipped at the edges to shape. Two categories are delineated according to the size of the slabs. Table 20 gives the provenience and descriptions for these two groups.

Tablets. The tablets are thin, 0.6 to 1.1 cm, fine-grained sandstone or slate slabs which have been elaborately manufactured. Both faces are ground and polished, and the edges, which are

TABLE 17

PROVENIENCE AND DESCRIPTION FOR POLISHING PEBBLES

Field Number	Provenience	Material	Length	Width	Thickness	Faces With Polish	Comments
17	Kiva A, Floor fill	Qe	3.4	2.4	1.5	1	
16	Kiva A, Bench fill	Qe	3.3	2.2	1.5	1	
10	Room 2, Floor fill	Qe	4.3	2.9	1.5	1	
7	Room 2, Floor 1 F.A.8	Se	3.9	3.4	1.2	2	
7	Room 2, Floor 1 F.A. 14	Qe	2.8	2.6	1.4	3	
7	Room 2, Floor 1 F.A.31	Qe	6.4	4.2	1.9	1	
252	Room 20, Level 2	FgQe	4.0	3.5	1.4	all	multidirectional striations
18	Room 6, Fill	FePy	4.5	4.0	2.5	1	
18	Room 6, Fill	FePy	4.8	3.4	1.8	1	
231	Room 9, Floor 3 fill	QeSe	3.0	2.4	1.3	1	
234	Room 9, Subfloor 3 fill	FgQe	2.2	1.2	0.6	all	one-directional striations on faces
279	Room 22	FePy	6.7	3.9	2.4	4	3-cm of polish on four sides with striations across width

TABLE 18

PROVENIENCE AND DESCRIPTION FOR ANVILS

Field number	Provenience	Fragment	Length	Width	Thickness	Material	Comments
3	Kiva A, Fill		25.3	15.1	7.8	Con	
3	Kiva A, Fill		23.5	13.6	3.2	Qe	shaped
5	Kiva A, Floor F.A.49		11.0	7.3	1.8	QeSe	shaped, striations
148	Room 10, Level 5	x	14.5	12.8	7.3	QeSe	shaped, striations
285	Room 20, West wall	x	12.9	11.9	4.1	FePy	striations
37	Room 9, Fill		16.6	9.6	6.4	Qe	hematite strains
41	Room 9, Floor 3, F.A.10		16.3	13.7	3.6	Con	shaped, pecked face
118	Room 9A, Floor 1 F.A.13		26.5	20.7	5.4	FePy	striations
135	Room 16, North wall		22.2	11.7	4.5	QeSe	striations
2	Unknown		12.9	12.6	3.1	Qe	
2	Unknown		22.6	12.2	12.5	fgSe	striations
21	Unknown		18.8	13.3	9.4	Qe	

TABLE 19

PROVENIENCE AND DESCRIPTION FOR GROOVED STONES

Type	Field number	Provenience	Material	Length	Width	Thickness	Sides used	Comments
Simple grooved abraders	164	Room 10, Floor 1	FgSe	25.0	30.0	3.7	2	two parallel grooves
	143	Room 9A, Floor 1 fill	MgSe	22.5	18.0	7.2	1	two grooves at right angles
	173	Room 15, West wall	FgSe	29.0	19.9	3.9	2	pecked depression
Elongated shaftsmoother	7	Room 2, Floor 1 F.A.21	Se	4.2	2.8	2.4	1	
	11	Room 5, Floor fill	CgSe	5.2	5.2	2.6	1	convex base

TABLE 20

PROVENIENCE AND DESCRIPTION FOR LARGE AND SMALL WORKED SANDSTONE SLABS

Type	Field number	Provenience	Fragment	Length	Width	Thickness	Ground faces	Comments
Large	26	Kiva A, Ventilator tunnel		70.5	50.0	4.5		ventilator tunnel cover
	6	Room 2, Fill	x	37.0	31.0	2.0	2	rectangular
	6	Room 2, Fill		64.0	38.0	3.5	2	rectangular
	19	Room 8, Fill	x	53.0	34.5	2.0		rectangular
	27	Room 8, Level 2	x	42.5	43.0	4.5		rectangular
	34	Room 8, Subfloor 1		69.0	37.5	6.5		rectangular
	171	Room 10, Floor 1	x	22.2	18.5	3.2	2	rectangular
	157	Room 10, Level 6		59.2	35.2	2.1	2	rectangular, edges worn
	160	Room 10, Floor 2, Fea. 1	x	37.0	25.4	2.5		rectangular, edges worn, set in floor
	160	Room 10, Floor 2, Fea. 3		36.0	29.9	4.4		set in floor
Small	12	Kiva A, Below bench fill	x	11.2	10.2	1.2	1	end ground
	12	Kiva A, Below bench fill	x	16.5	12.8	2.0	1	fire-burned
	5	Kiva A, Floor F.A. 49	x	11.0	7.3	1.8	1	fire-burned
	329	Kiva B, Floor fill	x	7.6	6.8	3.8	1	end ground, striations on face
	19	Room 8, Fill	x	9.0	7.3	1.2	1	fire-burned, curved edge
	23	Room 6, Floor 1, firepit	x	13.5	7.0	2.5		fire-burned, curved edge
	150	Room 9A, Floor 1, Fea. 2		18.2	17.0	4.4		light grinding all surfaces, fire-burned, pot rest?
	173	Room 15, West wall	x	20.3	15.2	1.6		

TABLE 21

PROVENIENCE AND DESCRIPTION OF SHAPED TABLETS AND SANDAL LASTS

Field number	Provenience	Fragment	Material	Length	Width	Thick-ness	Comments
3	Kiva A, Fill	x	sandstone	8.5	10.0	0.8	
12	Kiva A, Below bench fill	x	sandstone	13.5	7.5	1.1	2 pieces
17	Kiva A, Floor fill	x	sandstone	10.8	9.8	0.9	3 pieces
26	Kiva A, Floor vault	x	sandstone	5.7	5.2	0.8	same tablet as FS 17
26	Kiva A, Floor vault	x	sandstone	12.3	6.2	1.1	
6	Room 2, Fill	x	sandstone	11.0	5.0	0.7	
6	Room 2, Fill		slate	18.0	9.7	0.7	hematite stains
6	Room 2, Fill	x	sandstone	7.0	6.9	0.8	curved edge
190	Room 10, Level 7	x	sandstone	15.4	14.4	0.8	sandal last, 2 pieces
190	Room 10, Level 7	x	sandstone	15.1	9.5	0.8	2 pieces
160	Room 10, Level 8	x	sandstone	6.0	5.0	0.9	
24	Room 6, Subfloor 1	x	sandstone	23.7	12.4	0.8	sandal last, 4 pieces
243	Room 20, Level 2	x	sandstone	7.8	6.2	0.6	curved edge
229	Room 22, East wall, interior	x	sandstone	7.3	4.2	0.8	broken edge reused as abrader
1	Surface	x	sandstone	5.6	3.7	0.9	
2	Unknown	x	sandstone	12.7	11.3	0.9	3 pieces

chipped to shape, are ground to rounded or straight cross-sections. A curved-edged piece may be a fragment of a sandal last or some other type of shaped slab. Table 21 gives the provenience and description for the tablets and sandal lasts (Fig. 21).

Tchamahia. There is a single fragment of black hornfels, well polished on the faces and edge, which is probably a fragment of a tchamahia.

Petrified Wood. There is one fragment of a worked piece of petrified wood from level 8 in Room 10, the thick trash layer above Floor 2. This fragment is tabular in form with two ground faces, and one edge which is ground to a curved profile. Rohn (1971:242) reports nine tabular sections of petrified wood from Mug House. He indicates that petrified wood is considered sacrosanct by Pueblo Indians and suggests that these objects may have been ceremonial paraphernalia.

Paint Grinder. This object of fine-grained sandstone has a tabular form. Both faces are ground smooth with one lateral side tapering to an edge. The side opposite the tapered side and one edge are ground straight. The other edge is uneven but also shows some grinding and shaping. The tapered edge has striations parallel to the edge and hematite stains extending on both faces, indicating its use as a paint grinder. The length of the edge had been moved sideways against the grinding surface. Judd (1954:125-125) describes similar objects from Pueblo Bonito which he calls "sandstone saws." Two of these are double edged, but nine are single edged, like the specimen from Escalante. Judd indicates that the sandstone saws are beveled equally from both sides along the edge, and some of the edges were noticeably dulled. He did not indicate that any of the sandstone saws had paint stains.

Figure 21: Partial sandstone tablet in the shape of a jog-toed woven sandal.

Ornaments

Pendants. There are two pendants from the site.

One pendant is made of lignite. It is circular in shape, with a biconical hole drilled near the edge (Fig. 22). A circular concave depression ground in the center of one face was probably inlaid with another stone. The piece is ground and polished on both faces, with the edges ground straight in profile. This piece, which is from Floor 2 in Room 10, measures 2.3 cm in diameter and is 0.2 cm thick.

The second, a lignite and turquoise pendant, was found in the fill of Room 2, 20 cm above Floor 1. The base of the pendant is a square piece of lignite, flat on one side but convex on the base, with a hole drilled in one corner. A second flat square piece of lignite was glued around the resulting border (Fig. 23). It measures 2 cm square and is 0.3 cm thick. Judd reports a similar pendant from Pueblo Bonito (1954:99-100, Fig. 20). He reports that this pendant has a countersunk border instead of having an attached lignite square.

A comparison of the adhesive from the pendant with non-volatile residues from pine pitch and gum from the prickly pear cactus was made by mass spectroscopy analysis to determine what substance was used for the adhesive. This analysis was performed by Roger S. Chichorz, Organic Mass Spectroscopy Laboratory, Rockwell International, Rocky Flats Division, Colorado. The obtained spectrums are illustrated in Figure 24. Chichorz's report on the analysis is as follows:

> Samples of pine pitch and gum from the prickly pear cactus were artificially aged (i.e., volatile constituents were removed) by heating in a vacuum desiccator in order to approximate the centuries-old weathering of the Escalante Adhesive. The resulting residues from the pine pitch and

Figure 22: Circular jet pendant.

Figure 23: Turquoise and jet mosaic pendant.

cactus gum were mortar-and-pestle ground, mixed with a potassium bromide matrix, pelletized at 20,000 p.s.i., and their infrared spectra recorded. Likewise, a portion of the Escalante adhesive was ground, mixed with potassium bromide, pelletized, and its infrared spectra recorded. The infrared spectra, which are characteristic of the chemical structures of material, are compared below (see Figure 24).

Pine pitch residue: the spectrum is indicative of lignin and terpene (noncarbohydrate) derivatives.

Prickly pear sap residue: the spectrum is characteristic of several types of plant gums (polysaccharides, carbohydrates).

Escalante adhesive: the spectrum is characteristic of plant gums and resembles, but is not identical to, the spectrum of the prickly pear sap residue. This adhesive was probably derived from a cactus rather than from a pine tree based on these spectral similarities. In addition the adhesive contained siliceous matter (absorbance bands at 1,020 cm and 466 cm); this may have been indigeneous to the plant from which the organic portion was extracted or may have been deliberately added from another source (such as clay) for the purpose of thickening or filling (adding bulk to) the adhesive. Siliceous matter (inorganic silicates) is not detected in either the pine- or cactus-derived residues.

Further mass spectrscopy analysis is planned for comparing the sample with lac specimens and with adhesive from pendants of the Dominguez Ruin, 5MT2148 (Reed, 1977 and this volume).

Paint Stones. A single piece of hematite was recovered from the site in the ventilator tunnel in Kiva A. One piece of limonite was recovered from the Kiva B fill. Neither of these displays use.

Miscellaneous

Petroglyphs. Eight building stones, each with a design pecked onto one surface of the stone were recovered from the site. Seven of these have the design on the exposed end of the building stone, one is on the cleavage plane face of the stone.

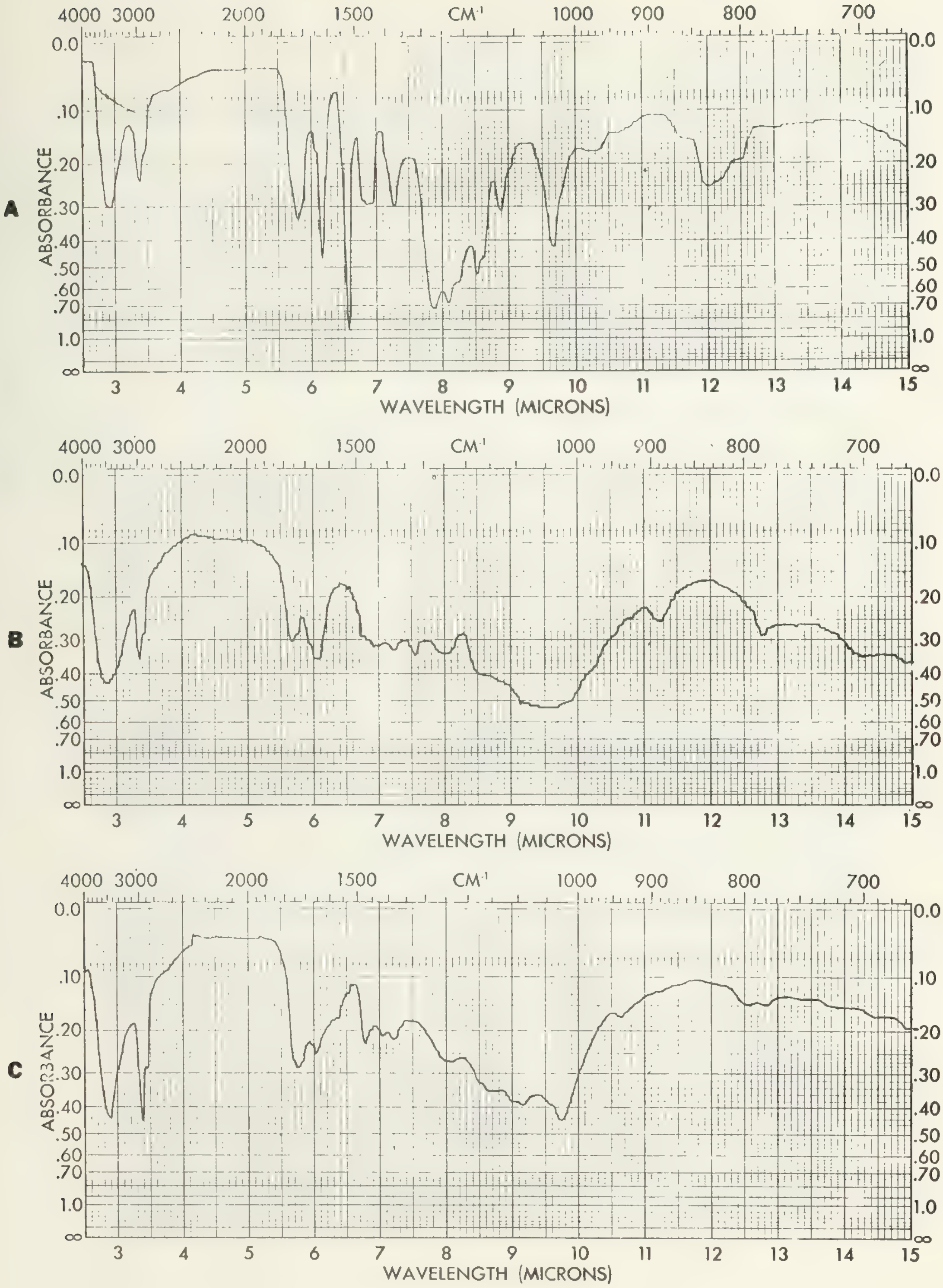


Figure 24: The infrared spectras. a, Pine pitch residue, 24 hours at 120^{0} C; b, Prickly pear sap, dried down; c, Adhesive residue from the jet and turquoise pendant.

Three of the stones have spiral designs (Fig. 25). Two have concentric circles, one with three (Fig. 27), the other with four circles (Fig. 28). One stone has an irregular curvillinear design which covers its whole face including a pecked border extending from one edge of the stone into two spirals (Fig. 26). Another stone has a biomorphic figure pecked and incised on one face (Fig. 29). The final stone has its exposed face shaped into a circle which is pecked but with no discernable design (Fig. 30). Table 22 gives the measurement and descriptions for the petroglyphs.

The first five stones described were found in the wall rubble from the stabilization trench along the exterior of the north wall of the pueblo. The remainder of the stones are of unknown provenience, but may have been used in the north wall as well. No petroglyphs were found built into the walls so it remains uncertain whether these stones had been incorporated in the wall with an exposed decorated face, or whether they had been used as reused building stones disregarding the previously decorated faces. Two of the stones have an alternate face which is flat and finished by pecking. The others appear to have been utilized with the decorated face exposed.

Petroglyphs on building stones have also been reported from the Mesa Verde (Fewkes 1911:67, Pl, 23, 1917:472, 1919:12, Fig. 4; Franke 1932:29-32; Hayes and Lancaster 1975:166, Fig. 215) and from northeastern Arizona (Woodbury 1954:162; Kidder and Guernsey 1919:196, Fig. 97). Two additional petroglyphs were recovered from the Dominguez Ruin (Reed 1977:98-100 and this volume) from the north exterior wall rubble, a similar provenience to the stones from Escalante. These stones have spiral designs on one side similar to the above described stones.

TABLE 22

MEASUREMENTS AND DESCRIPTIONS OF THE PETROGLYPHS

Field Number	Length	Width	Thick-ness	Comments
82	22	15	10	spiral, 3 loops
81	26	26	15	spiral, 3 loops
85	19	13	14	3 concentric circles
86	22	13	23	4 concentric circles cleavage plane face
83	22	19	13	spiral, 5 loops
84	18.5	15	13.5	2 spirals at irregular angles
87	21	22	12.5	biomorphic figure
88	13	14	14	indeterminable design, end shaped to circular form

Figure 25: Petroglyph with a spiral design.

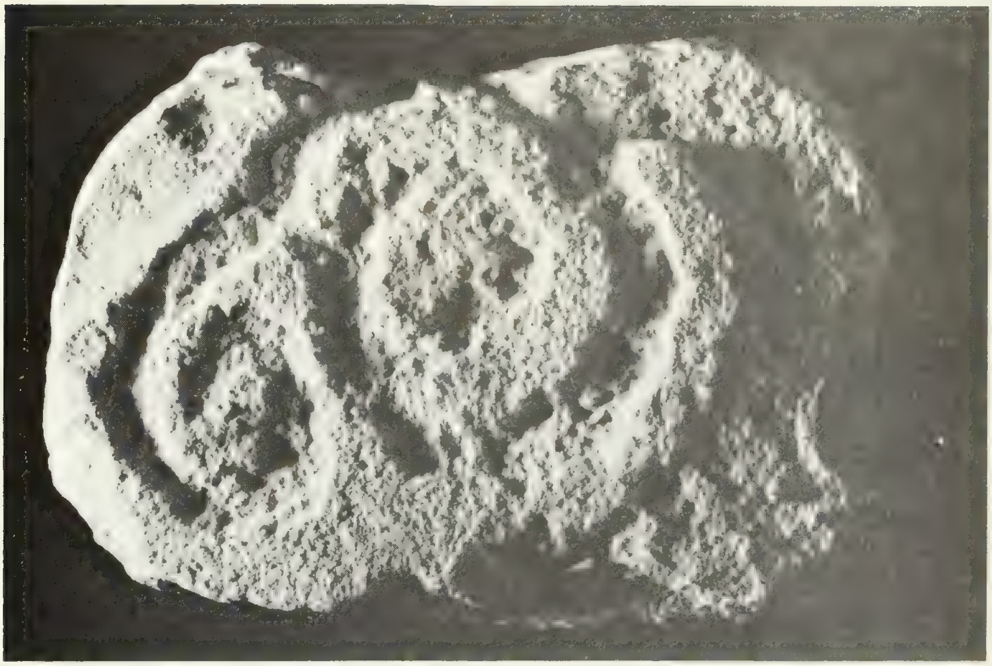


Figure 26: Petroglyph with an irregular curvilinear design.

Figure 27: Petroglyph with a concentric circle design.

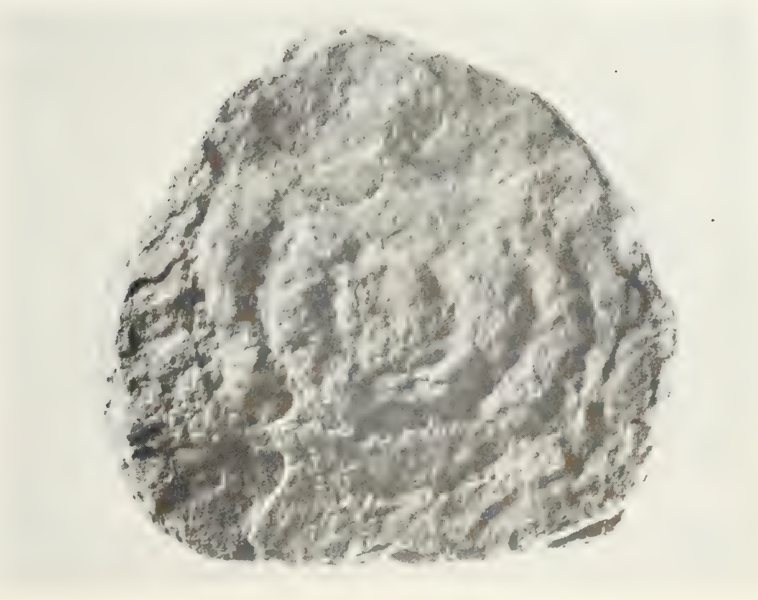


Figure 28: Petroglyph with a concentric circle design.

Figure 29: Petroglyph with a biomorphic figure.

Figure 30: Petroglyph with a pecked circular face.

Building Stone Effigy. The effigy is carved from a sandstone block, one end of which is a blocked building stone, the other end being the neck and head of an animal (Fig. 31). The figure had been formed by pecking and grinding. It has a long pointed snout, an incised groove for a mouth, two concave circles at the snout edge for nostrils (at the edge of a small broken chip), a bulging brow ridge with no well defined eyes, and slight bulges on the forehead which may represent either immature horns or ears. The neck is steeply indented from the back of the head. It measures 23.5 cm in length, 9.0 cm in width, and 14.0 cm thick. The stone came from the surface rubble of the site just north of Kiva A.

Stone animal sculptures are present in the Mesa Verde area from Far View House (Fewkes 1917:480), from Pipe Shrine House (Fewkes 1924:384, Pl.4, Fig. 4) and from northeastern Arizona Woodbury 1954:158-162). These sculptures are commonly carved in the round depicting the entire animal. The forms are plump with stubby legs and ears with details in low relief. The type of sculpture found at this site, apparently intended to be located in a wall with the head extending out from the wall, is not known from any other site in the Mesa Verde area. The execution of the figure also exhibits a higher degree of skill than the sculptures typical for the Mesa Verde area.

Sandstone Concretion. There is one sandstone concretion, suboval in shape with a small natural hole in one end. Sandstone concretions are abundant in sites on Mesa Verde (Rohn 1971:243-244; Hayes and Lancaster 1975:164).

Fossil Molluscs. Fossil molluscs, Gryphae newberri, were recovered in the excavation. These fossils erode out of the Mancos Shale and are present in the plains located below the Escalante hill. None of the specimens had any wear indicating

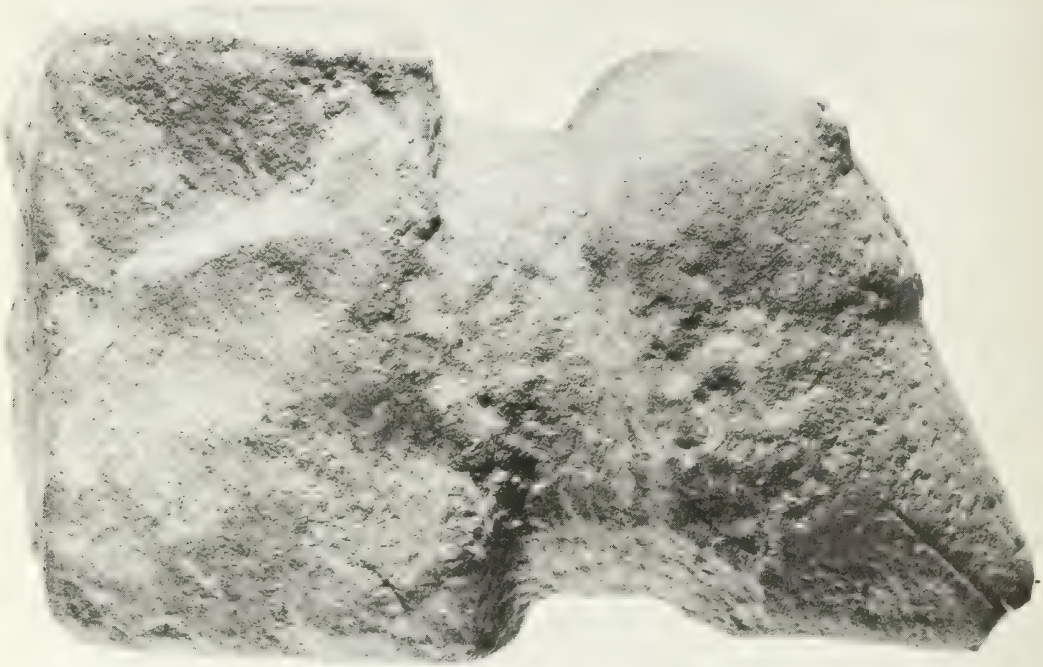


Figure 31: Building stone effigy designed to extend from a masonry wall.

indicating use, and their presence appeared to be random in the fill. Although the fossils may have been brought purposefully to the site, it is also possible that they were brought with sand or soil to be used for mortar.

Shell

There are only three occurrences of the use of shell at the site.

A single shell bead made from an olivella shell is from the ventilator tunnel fill in Kiva A. The bead is tubular, ground smooth at both ends.

A fragment of a worked piece of glycymeris was recovered from Room 8 in the Level 2 fill. The fragment is approximately 1 cm in length, is well polished, with a groove running along the edge. It is not possible to tell what the whole piece might have been.

Half of a glycymeris bracelet came from the Room 9A floor, the third occupation floor level.

Bones

Mammals and Birds. The mammals found at the site include Rocky Mountain Mule deer (*Odocoileus hemionus*), Pronghorn antelope (*Antilocapra americana*), mountain sheep (*Ovis canadensis*), Bison (*Bison bison*), Canis (*Canis* sp.), Texas Jack rabbit (*Lepus californicus texianus*), Western cottontail (*Sylvilagus auduboni*), Yellow-haired Porcupine (*Ereltuzon epizanthum*), Marmot (*Marmota flaviventisis*), Pocket gopher (*Thomomys talpoides*), Rock squirrel (*Citellus varigatus*), Wood rat (*Neotoma albigula*), Deer mouse (*Peromycus* sp.), Prairie dog (*Cynomis* sp.), and Beaver (*Caster* sp.). The birds identified from the site include Turkey (*Meleagris gallopavo*), Red-tailed Hawk (*Buteo jamaicensis*),. Swainson's Hawk (*Buteo*

swainsoni), Common Raven (Corvus corax), and the Mourning Dove (Zenaida macroura).

The above list indicates the animal and bird remains found in the excavation units. Complete listings of the animals present in the region are found in Gregory (1938) and Brew (1946). Emslie (1977:22-26) gives a listing of mammals and birds sighted in Mancos Canyon.

The charts in Appendix A give the numbers of animal bones and minimum number of individuals (MNI) for the proveniences within the rooms and the kivas.

The cottontail was the most populous individual represented by skeletal remains in the excavation. A minimum number of 75 individuals of cottontail were identified. The evidence of butcher marks, burned bones, and modification found on cottontail bones indicates that the cottontail had been utilized by the prehistoric dwellers of the ruin. However, this figure is skewed by the evidence that the cottontail rabbit had been a post abandonment feature using the soft dirt within the ruins for burrows. This activity was most clearly seen in the ventilator tunnel fill of Kiva A. The dense bone bed in the tunnel included 25 individuals of cottontail and numerous other bones which could have been shifted by the rabbits' activities.

The jackrabbit was represented by a minimum number of seven individuals. Other small rodents given in decreasing numbers of individuals (MNI) were rock squirrel (seven), pocket gopher (five, wood rat (four), prairie dog (three) and deer mouse (two).

The artiodactyla family was represented by deer (eleven), antelope (seven), mountain sheep (two), and bison (one). An additional twelve individuals of Artiodactyla sp. were present but were not identifiable as to species. Only one bison bone was

identified at the site. Since this bone was present in the ventilator tunnel fill, it unknown whether it represents utilization of the animal by the prehistoric inhabitants or if this could be a result of post abandonment activity.

The turkey was the third most populous animal from the site represented by a minimum number of nine individuals. Other birds, as identified by Steve Emslie (Appendix B), were present in very low frequency. These include the Red-Tailed Hawk (one), Swainson's Hawk (one), Common Raven (one), and Mourning Dove (one). These birds have a natural occurrence in the region, and they might have been utilized by the prehistoric peoples for their food value as well as the use of the feathers. There is a single occurrence from the bird remains of a pygostyle, the tail bone of a bird which holds the tail feathers. The bone was from an unidentified bird of small to medium size. It is possible that this bone had been removed from the bird attached to the tail feathers which might have been valued for some use.

Fish. Two fish bones and 52 fish scales were found at the site. The bones have not yet been identified. The scales are from a gar (Lepistoseus sp.). The scales of this fish are of a bony material, one side covered with an enamel similar to dental enamel. The section of 52 scales was found in the natural interlocking position about 7 cm long and 2 cm wide. This section included the median line of the fish and scales from either side, although not identified as to dorsal or ventral. Given the size of the scales the fish would have weighed about two pounds and would have been 2 feet in length. This represents a medium or small size gar, some species of which can grow to 6 feet in length.

Remains of gar have been reported in the literature from two other southwest sites both in Chaco Canyon. At Kin Kletso parts

of a lower jaw and 25 scales of a gar were found (Vivian and Mathews 1964:22-23). Although a species identification for the scales cannot be made, the lower jaw was identified as being from a Longnose gar (Lepistoseus osseus). Judd (1959:35) has also reported gar scales from pueblo del Arroyo.

Six species of gar occur in the United States with a distribution restricted to the east side of the Rockies (Eddy 1969:39). The gar are found primarily in the Mississippi drainage and in the smaller Gulf drainages of Mexico (Pflieger 1971:469-470). The Longnose gar (Lepistoseus osseus) is found today in the Rio Grande to about the Texas-New Mexico border. There is some evidence that in historic times the gar might have had a wider distribution in the Rio Grande, perhaps up into middle New Mexico (Tom Mathews, personal communication). This would be the source favored for the gar present at Escalante. It is uncertain as to whether the gar would represent a trade item or procurement by the Escalante inhabitants or whether the item had been brought from Chaco Canyon or some place to the south.

The gar are known to have been used for many purposes. This fish is used in the diet of the Seminole Indians in the Everglades and the scales have some use in making ornaments and jewelry (Herald 1972). The scales of the gar, probably of a larger fish than our specimen, have been used ethnographically as arrow points by the Cherokee Indians (Williams 1948:85).

The scales found at the Escalante site were found in the floor fill of Room 5. Since there were no other bones of the fish found with the scales, it does not appear that it was used for food. The state of the scales found in a rectangular unbroken strip suggests their possible use as an ornament, though for lack of any further comparison their purpose at the site remains uncertain.

A total of 89 bone artifacts were recovered from the site. These include those bones which had been modified for use as tools or as ornaments, but excluding those with random marks for butchering. The artifacts are grouped into broad functional categories.

Table 23 denotes the distribution of the artifact types with animal forms. The artiodactyla family is the most well represented, accounting for 53 percent of all the bone artifacts. This indicates a selection for this bone in the worked bone tools since the artiodactyla family represents only 37 percent of the bone from the site (calculated excluding the unidentified fragment count), and is second in bone count to the *Sylvilagus* genus.

Classification of Awls, Reamers, and Weaving Tools. This grouping of artifacts includes almost half of the worked bone artifacts, including the three most numerous groups of tool types. The form of these three types is very similar. All are tapered, pointed instruments but the wear present on the tools separates them into different functional categories. They are classified by morphological criteria to display any possible relationship between form and function. The criteria presented includes the amount of modification of the bone and the tip shape.

The initial classification of the tools includes the functional categories separating the three tool types. Awls have a sharp tapering point which is used for piercing. This action leaves minute striations parallel to the shaft of the tool and results in a dense polish on the tip. The reamer is used for piercing but is rotated in use, thus producing striations perpendicular to the shaft of the tool near the point. Weaving tools are highly polished along most of the shaft and usually have a sharp and polished point. These tools had been used to pack down the weft threads, rubbing against the tightly stretched warp

TABLE 23

DISTRIBUTION OF ANIMAL FORMS WITH ARTIFACT TYPES

	Awls	Reamers	Weaving Tools	Scrapers	Bone Tubes	Perforated Tibias	Antler Tines	Miscellaneous	Fragmentary	Stock Pieces	Totals	Percents
Mammals, Unknown	6	2	4					1	3		16	18.0
Artiodactyla, sp.	9	3	8	4				1	9		34	38.2
Antilocapra americana (pronghorn)			1	2							3	3.4
Odocoileus hemionus (mule deer)			3	1			2	1	1	2	10	11.2
Lagomorphs												
Sylvilagus sp. (cottontail)								6	3		9	10.1
Lepus sp. (jackrabbit)						1			3		4	4.5
Canis sp.		1							1		2	2.2

TABLE 23 (Continued)

	Awls	Reamers	Weaving Tools	Scrapers	Bone Tubes	Perforated Tibias	Antler Tines	Miscellaneous	Fragmentary	Stock Pieces	Totals	Percents
Bird Unknown								1			1	1.1
Melearis gallopavo (turkey)	2	1			4				1	1	9	10.1
Rodent Unknown								1			1	1.1
Totals	17	7	16	7	4	1	2	11	21	3	89	

threads. This use results in the diagnostic wear found above the tip and on the shaft: striations are formed perpendicular to the length of the tool and eventually one or more deep parallel grooves are developed.

The modification of a bone to form an awl is the first criteria of classification. This is the observable form of the tool, which determines its versatility for the user, and will often obscure the species identification of the bone. The classification is arranged by Kellie Masterson, based on Kidder (1932:203-217). Kidder distinguished whether the articular end of the bone is whole (1), split (2), or if the tool is made of a bone splinter (3). He further distinguished the degree of modification for the split awls. His categories are elaborated here to indicate whether the head of the tool (for a whole or a split awl), or the edges of the tool (for a splinter awl), are unmodified (a), slightly modified (b), or completely modified (c).

Table 24 presents the number of awls, reamers, and weaving tools displaying the different forms of bone modification. Although as seen in the table there is no clear cut dicotomy of form, there appears to be a different selection between the awls and the weaving tools. The majority of the awls, 65 percent, are splinter awls; the rest are split, but none are whole shaft. The largest percentage, 56 percent, of the weaving tools are split. Some are whole shaft, but proportionally fewer are splinter when compared with the awls. Perhaps the whole or split bone provided a stronger or a bigger tool which may have been preferable for a weaving tool since the wear on this tool extends along the shaft. The weaving tools are, on the average, 4 cm longer than the awls. The reamers show a range of forms with no preponderence of one type, but the sample for this group is small, less than half that of the other two groups.

TABLE 24

MODIFICATION OF BONE IN AWLS,

REAMERS, AND WEAVING TOOLS

	Awls	Reamers	Weaving Tools
1-			1
1a		1	2
2-	3		3
2b	1	2	3
2c	2		3
3-		1	
3b	1	1	1
3c	10	2	3

TABLE 25

DISTRIBUTION OF TIP SHAPE FOR AWLS,

REAMERS AND WEAVING TOOLS

	Awls	Reamers	Weaving Tools
A	4		1
B	7	4	8
C		2	2
D		1	
E	1		

The tip shape classification (Fig. 32) is based on Morris and Burgh (1954:60, Fig 32). They identify five categories, which are designated here as: (A) long, very slender, needlelike; (b) long, uniformly tapered; (C) long, slender with concave sides; (D) blunt, with a rounded point; (E) blunt, with a flat point.

The various tip shapes may represent the shaping of the tool, wear by functional use, or progressive wear on a given tool. Morris and Burgh (1954:60) suggest progressive wear for two of the types: That (B) will grade into (C) through the wear and resharpening.

Table 25 presents the distribution of the tip shapes for the tool types. Tip shape B is the predominant form in all three tool types. Type A is a common awl tip form and is present in one weaving tool, but is not present as a reamer tip. There are four tools with type C tips, two of these being reamers and two weaving tools, one of which is a reamer tip. This indicates the possibility that the concave sides of the type C tip may be a result of the reamer action which, perhaps, as Morris and Burgh have suggested, grades from the Type B tip, the predominant form in the reamer category. Morris and Burgh have also suggested, however, that this type B-C tip results from basket making.

Morris and Burgh (1954:60) suggest, also, that there is no correlation between the joint ends and tip shape. A larger sample than is present here would be needed to test this hypothesis. Although no direct bone modification and tip shape correlation is evident, there does appear to be, as indicated in the above discussion, a tendency toward a predominance of certain types within the three tool categories, which may produce an indirect relation between joint ends and tip shape. Tables 26-28 and Figures 33-35 illustrate provenience and type of bone tools.

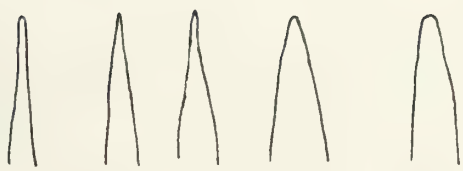


Figure 32: Bone awl classification. a, Long, very slender, needle like; b, Long, uniformly tapered; c, Long, slender with concave sides; d, Blunt, with a rounded point; e, Blunt, with a flat point.

TABLE 26

PROVENIENCE AND DESCRIPTION OF BONE AWLS

Field Number	Provenience	Shaft Type	Head or Edge	Tip Shape	Frag- ment	Length	Width	Thick- ness	Fig. 92	Animal Form
16	Kiva A, Bench Fill	3	c	-	x	6.3	0.9	0.4	-	mammal long bone
17	Kiva A, Floor Fill	2	c	-	x	4.7	0.8	0.6	-	Artiodactyla sp. metapodia
4	Kiva A, Bench F.A.18	2	c	A		13.0	1.1	0.8	f	Artiodactyla sp. metapodia
43	Kiva A, Pilaster 6	3	c	B		18.3	1.4	0.7	e	Artiodactyla sp. tibia
10	Room 2, Floor Fill	3	b	E		8.7	0.8	0.5	l	Artiodactyla sp. metapodia
27	Room 8, Level 2 Fill	3	c	B		8.9	0.7	0.6	h	mammal long bone
27	Room 8, Level 2 Fill	2	-	B		5.3	0.9	0.6	-	turkey, right tibiotarsus
27	Room 8, Level 2 Fill	3	c	-	x	7.1	1.3	0.6	-	mammal long bone
33	Room 8, Floor 1 Fill	3	c	A		13.4	0.7	0.3	m	mammal long bone
185	Room 10, Level 7	2	-	-	x	4.2	1.4	0.5	-	Artiodactyla sp. humerus
201	Room 10, Level 8	2	-	B	x	7.5	1.2	0.5	-	Artiodactyla sp. long bone
8	Room 5, Fill	3	c	B		7.5	0.9	0.3	j	turkey long bone
18	Room 6, Level 1	2	b	-	x	4.7	1.7	0.7	l	Artiodactyla sp. metacarpal
24	Room 6, Level 3	3	c	B	x	3.6	0.5	0.3	-	mammal long bone
30	Room 6, Floor 2 Fill	3	c	A		6.3	0.4	0.3	k	mammal long bone
31	Room 6, Floor 2 F.A.7	3	c	B		12.1	1.0	0.7	g	Artiodactyla sp. metapodia
236	Room 9, Subfloor 3	3	c	A		8.6	1.0	0.4	-	Artiodactyla sp. long bone

Figure 33: Bone tools: a-d, Reamers; e-l, Awls; m, Eyeless needle.

Figure 34: Bone weaving tools.

TABLE 27

PROVENIENCE AND DESCRIPTION OF BONE REAMERS

Field Number	Provenience	Shaft Type	Head or Edge	Tip Shape	Frag- ment	Length	Width	Thick- ness	Fig. 92	Animal Form
12	Kiva A, Below Bench	2	b	B		13.9	1.9	0.8	a	Artiodactyla sp. metatarsal
12	Kiva A, Below Bench	3	b	B		10.2	1.2	0.5	c	Artiodactyla sp. long bone
17	Kiva A, Floor Fill	3	c	C		12.4	1.2	0.6	b	mammal long bone
6	Room 2, Fill	1	a	C	x	7.1	1.5	1.1	d	Canis sp. left tibia
189	Room 10, Level 8	3	-	B	x	4.35	0.9	0.3	-	turkey long bone
8	Room 5, Fill	3	c	B		4.1	0.5	0.5	-	mammal
267	Room 24	3	b	D		11.1	2.0	0.9	-	Artiodactyla sp. long bone

PROVENIENCE AND DESCRIPTION OF BONE WEAVING TOOLS

Field Number	Provenience	Shaft Type	Head or Edge	Tip Shape	Frag- ment	Length	Width	Thick- ness	Fig. 92	Animal Form
3	Kiva A, Fill	2	c	-	x	13.2	1.5	0.8	d	mammal metapodia
3	Kiva A, Fill	2	c	B		9.1	1.5	1.0	g	Artiodactyla sp. metapodia
3	Kiva A, Fill	1	-	B	x	8.5	1.02	1.0	-	mammal long bone
12	Kiva A, Below Bench	1	a	B		19.2	3.7	1.1	i	deer ulna
12	Kiva A, Below Bench	2	b	B+		15.3	2.0	1.4	b	antelope metapodia
12	Kiva A, Below Bench	2	-	C	x	10.4	1.5	1.1	-	Artiodactyla sp. tibia
16	Kiva A, Bench Fill	2	-	B	x	8.2	1.0	0.6	-	Artiodactyla sp. long bone
6	Room 2, Fill	2	b	B		12.6	1.8	1.6	e	Artiodactyla sp. metapodia
7	Room 2, Floor 1 F.A.36	3	c	-	x	6.8	0.7	0.5	-	mammal long bone
7	Room 2, Floor 1 F.A.42	2	b	-	x	5.5	0.7	0.3	-	Artiodactyla sp. vestigual meta- carpal
27	Room 8, Level 2	3	c	B		9.6	1.0	0.5	f	mammal long bone
34	Room 8, Floor 1 F.A.23	1	a	-	x	9.0	3.4	2.3	h	deer ulna
160	Room 10, Floor 2 F.A.7	2	-	-+	x	2.7	1.0	0.5	-	Artiodactyla sp. long bone
160	Room 10, Floor 2 F.A.11	3	b	C*		10.5	1.7	1.0	-	Artiodactyla sp. long bone
8	Room 5, Fill	2	c	A		25.0	2.3	1.6	a	deer metatarsal
15	Room 5, Floor 2 F.A.13	2	c	B+		14.7	1.8	1.2	c	Artiodactyla sp. radius

+ awl tip

* reamer tip

Scrapers. This category includes six end scrapers and one side scraper. The descriptive information for these tools is given in Table 29.

Bone Tubes. Four bone tubes made from turkey bones were found. They range is size from 6.5 to 3.3 cm (Table 30, Fig. 35 d-e) and are all highly polished on the surfaces with ends that are rounded or beveled as well as polished. The interiors of the tubes show a light polish, showing that they had been strung and used as beads.

Perforated Mammal Tibias. Two specimens of perforated mammal tibias were found. One, from Room 10 Level 8, was made from the left tibia of a jackrabbit. This item consists of the proximal end of the bone and about one third of the shaft. The second (Fig. 55f) from the floor fill of Room 9, F.S.40, has a conical hole drilled in the polished shaft. The ends of the piece are broken. It is made from the left tibia of a jackrabbit (Table 22).

Rohn (1971:250) and Hayes and Lancaster (1975:170) both indicate the probable function of this type of artifact as a "tinkler." Hayes and Lancaster (1975:190) report the occurrence of similar perforated mammal tibias in the Mesa Verde Region, from the Piedra River, and from the Ackmen-Lowry region, north of Mesa Verde. They report that the artifact is unknown south of the San Juan River.

Antler Tines. The two antler tines are unmodified sections of antlers. One is fairly short (Fig. 34), and the other is 22 cm long. Both are broken at the ends and display some use at the tips. The long tine has a point rounded from use. The tip of the short tine is almost obliterated from rodent gnawing, with a section of polish near the tip from hand use, possibly indicating the use of this tine as a flaker.

TABLE 29

PROVENIENCE AND DESCRIPTION OF BONE SCRAPERS

Field Number	Provenience	Frag-ment	Length	Width	Thick-ness	End or Side	Fig. 94	Animal Form
7	Room 2, Floor 1 F.A.15		15.1	4.2	4.0	E	a	deer humerus
27	Room 8, Level 2	x	6.6	3.7	1.1	E	b	Artiodactyla sp. tibia
178	Room 10, Level 6	x	7.8	2.5	0.8	E	-	Artiodactyla sp. humerus
178	Room 10, Level 6	x	5.5	2.8	0.8	E	-	antelope, left humerus
185	Room 10, Level 7	x	5.3	2.7	0.8	E	-	Artiodactyla sp. humerus
247	Room 20, Level 2		13.7	2.3	0.9	E	-	antelope, left humerus
31	Room 6, Floor 2 F.A.32		4.3	0.7	0.3	S	c	Artiodactyla sp. scapula

TABLE 30

PROVENIENCE AND DESCRIPTION OF BONE TUBES

Field Number	Provenience	Frag-ment	Length	Width	Thick-ness	Fig. 94	Animal Form
3	Kiva A, Fill	x	6.5	0.9	0.3	e	turkey radius
7	Room 2, Floor 1 F.A.29		5.3	1.1	0.9	d	turkey tibiotarsus
189	Room 10, Level 8		3.3	0.9	0.8	-	turkey tibiotarsus
166	Room 10, Floor 2 F.A.9	x	4.1	0.9	0.4	-	turkey tibia

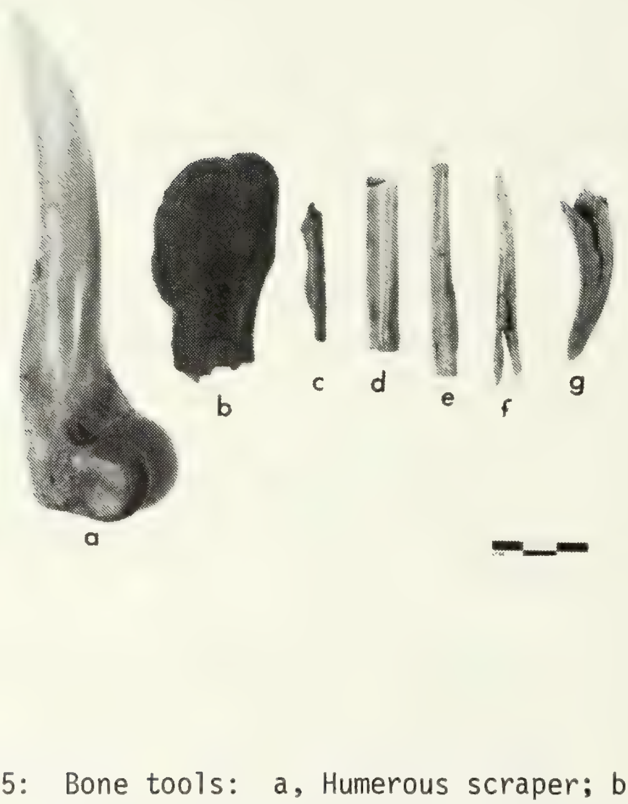


Figure 35: Bone tools: a, Humerous scraper; b, End scraper; c, Side scraper; d-e, Bone tubes; f, Perforated tibia; g, Antler tine.

Miscellaneous Artifacts. This category includes pieces which cannot be grouped in other categories. Table 31 indicates the provenience, measurements and bone identification for these artifacts.

One piece is a splinter of a larger tool whose surface had been highly polished. One edge of the bone shows wear from being used as a polisher.

A tool in the form of a long bone splinter whose end had been ground to a rounded edge was found in contact with the bench of Kiva B. A portion of the tip shows polish from a rubbing use.

Figure 36 illustrates a shaped deer mandible. It is the right half of the mandible extending from the diastema to the cavity of the last molar. The teeth have been removed from the mandible and the sockets ground, displaying a series of holes. The base of the mandible as well as the ends of the piece are modified by grinding and the surface of the bone has been lightly ground. The cancellous material was removed from the bottom half of the mandible but not from the sockets of the teeth. All surfaces of the bone are covered with a polish.

Morris and Burgh (1954:64) report on similarly shaped, though smaller, worked deer mandibles from Basket Maker II sites near Durango, Colorado, which were strung on a necklace. Although this mandible is longer than those of Morris and Burgh, it is possible that it was used in a similar fashion.

The final item is a group of bones which were found in a cluster in the fill above Floor 2 in Room 10. The cluster consists of a weaving tip (included in the weaving tool classification), six medial fragments of cottontail rabbit bones including one right humerus, three left tibias, and two right tibias, an unidentified rodent pelvis fragment, a medial fragment of an

TABLE 31

PROVENIENCE AND DESCRIPTION OF MISCELLANEOUS BONE

Field Number	Provenience	Length	Width	Thick-ness	Animal Form	Wear
25	Kiva A, Ventilator Tunnel	4.4	1.5	0.6	mammal longbone	edge polisher
313	Kiva B, Bench F.A.2	12.8	1.8	0.7	Artiodactyla sp. longbone	end polisher
6	Room 2, Fill	15.5	2.5	1.2	Deer mandible	shaped mandible

Figure 36: Shaped deer mandible.

unidentified bird tibia. The bones were all burned to differnt degrees from black to light brown, and all have a high luster which could have resulted either from polishing or from having been burned. They were recovered from the trashy charcoal-filled level above the floor, but may have been buried or deposited there in the trash fill independent of the floor association.

Fragmentary Modified Pieces. This category includes 20 pieces. They are bones which are fragments of larger tools showing polish or striations but lacking any diagnostic wear (Table 32).

Included in this category are two jackrabbit and three cottontail tibias which show some similarity to the perforated tibias. Each of the jackrabbit tibias have a hole drilled or ground in the side and one of the cottontail tibias has a hole drilled in the distal end. All of the bones have a high polish on the bone surface.

Stock Pieces. The objects in this group are either discards or tools in the process of being manufactured. Two pieces are deer metacarpals, one is split in half, and the other is intact but deeply scored on either side in preparation for splitting. The third bone is the proximal end of a turkey tibiotarsus. It is the discard from the manufacture of bone splinters. Six deep scores had been cut along the length of the shaft and a break had been accomplished by means of a score set vertically around the bone. These pieces are from the Kiva A Floor fill, Room 2 fill, and the Kiva A ventilator tunnel, respectively.

Human Bone

Although no burials were found in the excavations, a few human bones were found in the excavation levels. There were a total of 31 bones, all but one, a phalanx, which were fragmentary.

TABLE 32

PROVENIENCE AND DESCRIPTION OF FRAGMENTARY MODIFIED BONE

Field Number	Provenience	Length	Width	Thickness	Animal Form	Wear
3	Kiva A, Fill	4.7	1.4	0.8	mammal longbone	heavy polish
3	Kiva A, Fill	5.0	1.2	0.8	turkey, left tibiotarsus	manufacture groove
3	Kiva A, Fill	14.1	2.7	1.0	Artiodactyla sp.longbone	possible awl use
25	Kiva A, Ventilator Tunnel	10.8	1.5	1.5	Canis sp. ulna	polish
7	Room 2, Floor 1 F.A.7	5.3	1.8	0.5	mammal longbone	polish and striations
33	Room 8, Floor 1 Fill	916	1.0	0.8	Artiodactyla sp. metapodia	shaped, some polish
109	Room 10, Floor 1 F.A.22	7.4	1.2	0.4	deer, left ulna	polish area
178	Room 10, Level 6	6.6	0.9	0.4	cottontail, left tibia	polish, hole distal end
185	Room 10, Level 7	5.0	0.5	0.5	cottontail, left tibia	polish
189	Room 10, Level 8	5.1	0.5	0.5	cottontail, tibia	polish
205	Room 10, Level 8	4.0	1.0	0.4	jackrabbit, tibia	polish, ground hole in side
216	Room 10, Level 8	4.9	1.4	0.4	jackrabbit, left tibia	striations, polish
8	Room 5, Fill	6.2	1.1	0.8	Artiodactyla sp. rib	polish
30	Room 6, Floor 2 Fill	5.5	2.4	0.7	mammal longbone	polish
31	Room 6, Floor 2 F.A.8	9.0	2.2	1.7	Artiodactyla sp. femur	ground and polished
31	Room 6, Floor 2 F.A.32	6.2	2.2	1.2	Artiodactyla sp. radius	striations and grinding
233	Room 9, Subfloor 3	5.3	0.8	0.4	Artiodactyla sp. ulna	end of split bone awl
233	Room 9, Subfloor 3	11.7	2.4	1.3	Artiodactyla sp. radius	polish area
233	Room 9, Subfloor 3	3.8	1.5	0.6	Artiodactyla sp. longbone	ground and polished edge
68	Room 11	8.1	3.8	1.4	Artiodactyla sp. ulna	head of tool, awl (?)

These include 22 skull fragments, 2 femur fragments, 1 tibia, 1 clavicle, 3 phalanx, and 1 sacrum. The proveniences for the human bones are given in Appendix A.

A minimum number of five individuals could be distinguished by age, two immature individuals, a very old individual, and two individuals of average adult age.

Artifact Distribution

Room 2 (Fig. 37-38, Table 33)

The western half of the room contains mainly bone fragments on floor contact. In the northwest corner of Room 2 is a large concentration of bone fragments including deer, *Artiodactyla* sp., cottontail rabbit, and canis. Two of the deer bones exhibit butchering marks. In the corner surrounded by the cluster of bones is a fragmentary worked bone made from a mammal long bone, a broken piece from a larger tool.

A bone awl is located near the easternmost extension of this bone concentration, F.A. 42, made from a vestigial metacarpal from an artiodactyl, species unidentified. The awl displays polish from use but does not display wear patterns identifying a functional use. Within the area three polishing pebbles were found, F.A. 8, F.A. 11, and F.A. 14.

In the northeast corner another smaller bone cluster is accompanied by a polishing stone, as well as fragmentary worked bone.

A bone cluster rested above the unexcavated firehearth. This cluster was of the major portions of two individual rodents, a rock squirrel (41 bones) and a woodrat, probably a post-abandonment feature since the room lay open and abandoned before the roof fell.

A second artifact cluster surrounds the firehearth in the center of the room representing the probable use of this are for food preparation. This area includes the greatest sherd concentration in the room, although few sherds (a total of 45) were located on floor contact, and no whole pots were encountered. The sherds in the cluster include unidentified corrugated, unidentified plain gray, one Chapin Gray sherd, unidentified whiteware, and eight grayware sherd which form a 16 cm wide indented pot base. With the sherds located within the central area of the room are two manos and a core tool used as a hammerstone.

In the northeast corner of the room is a cluster of tools and a few, probably random sherds. The tools include a bone weaving tool, two core tools used as hammerstones, both of fine quartzite, a chert scraper, a rubbing stone, a mano showing hematite stains on its surface, possibly used as a lap anvil for grinding pigment, a hammer with a full groove and no apparent wear, possibly a ceremonial object, four non-utilized fine quartzite flakes, and one utilized very fine quartzite flake.

The southwest quarter of the room is bare of any floor contact artifacts.

A few other interesting artifacts are located on the floor but not associated with the above artifact clusters. A side-notched projectile point, F.A. 18, is located north of the firepit. Near it to the east is a small rectangular sandstone block, F.A. 21, with a groove on one side and bevelled on opposite edges which might have been used as a shaft straightener. North of these along the north wall is a bone tool, a humerus scraper (Fig. 35). Located near the east wall is a bone bead (Fig. 35d) which is well polished showing long use, probably as a decorative object.

TABLE 33

Artifacts found on Floor 1 of Room 2

Field No.	Artifact Description
7-1	17 bones
7-2	6 corrugated sherds
7-3	Bone
7-4	Non-utilized flake, Qe
7-5	2 Chapin Gray sherds
7-6	Bone
7-7	Fragmentary worked bone tool
7-8	Polishing pebble
7-9	8 bones
7-10	11 Mancos B/W sherds, 1 Moccasin Gray sherd, 3 corrugated sherds, 5 grayware sherds, 1 whiteware sherd
7-11	Polishing stone
7-12	Chapin Gray sherd, corrugated sherd, 3 grayware sherds
7-13	Mano
7-14	Polishing pebble
7-15	Bone scraper
7-16	Charcoal fragments
7-17	2 grayware sherds, 2 whiteware sherds
7-18	Projectile point
7-19	9 whiteware sherds
7-20	Bones
7-21	Grooved abrader
7-22	Bones
7-23	Core hammerstone
7-24	Grayware pot base
7-25	Mano
7-26	Hammer
7-27	2 non-utilized flakes, Qe; utilized flake, Qe
7-28	Mano fragment, polishing stone
7-29	Bone bead
7-30	Non-utilized flake, Qe
7-31	Rubbing stone
7-32	Scraper
7-33	Non-utilized flake
7-34	Non-utilized flake
7-35	Non-utilized flake, Qe
7-36	Bone weaving tool
7-37	Bone
7-38	Bone
7-39	Polishing stone
7-40	Bone
7-41	Core hammerstone
7-42	Bone Awl
7-43	Mano

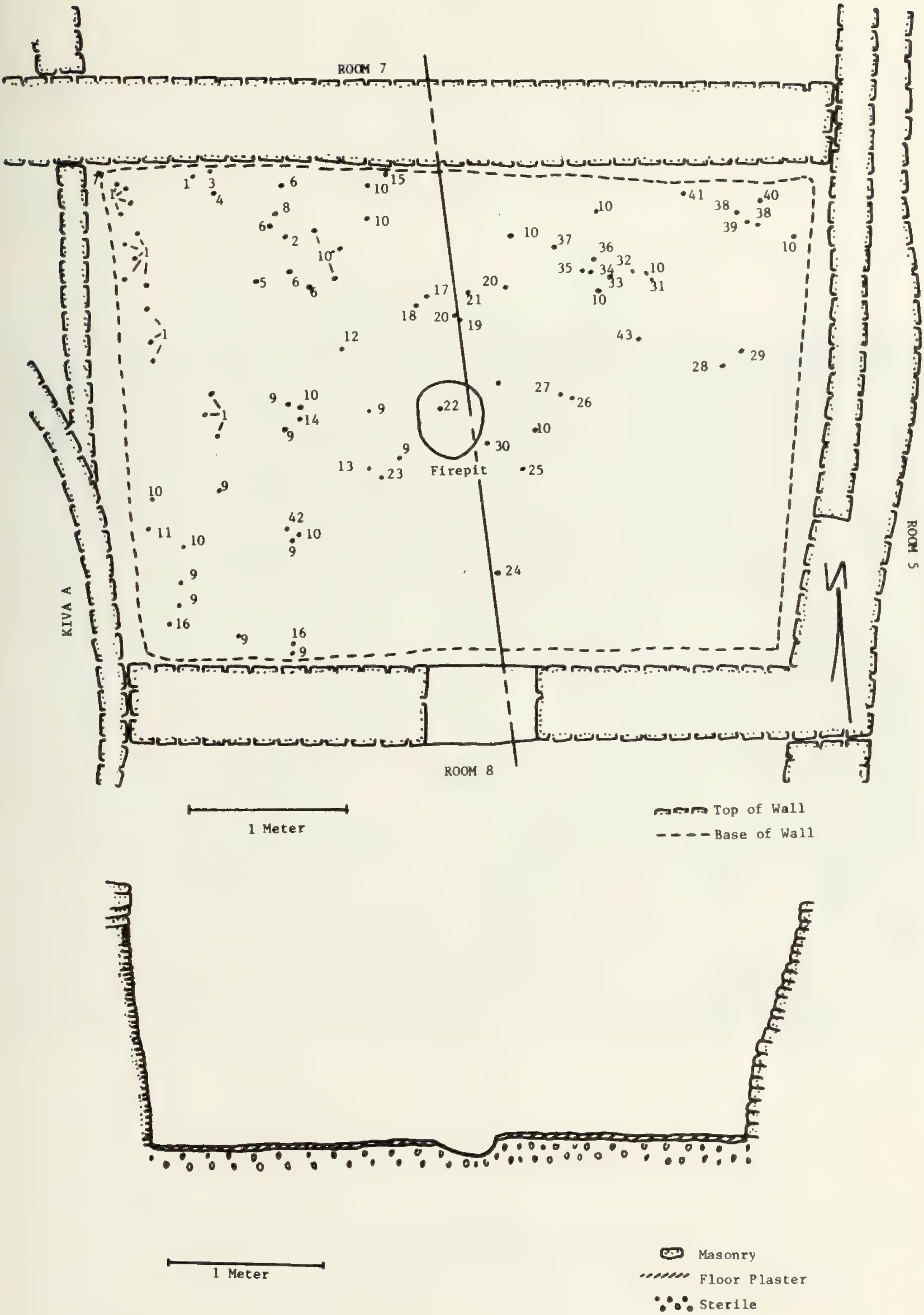


Figure 37: Plan and profile views of Room 2 showing Floor 2.

Figure 38: Floor 1 of Room 2 showing the artifacts on the floor and a section of the roof beams.

This room appears to have been used for cooking and as a work room for making various tools including bone tools and arrows.

Room 5, Floor 1 (Fig. 39-40, Table 34)

Against the north wall is a cluster of artifacts including a complete obsidian end scraper, three chipped stone flakes (one of which was utilized), bone fragments, and two sherds. This cluster was located next to the wall and may continue further north under the wall since this wall may be part of a later addition built across the room.

In the center of the room are two clusters of artifacts, located north and south of the cobble wall base in the floor. The north cluster is of six sherds, two bone fragments and one utilized obsidian flake. South of and partially over the wall base is an accumulation across the width of the floor of 27 sherds, 16 of which are corrugated, and one bone fragment.

South of this cluster of sherds and against the west wall a corrugated pot was set in the floor, probably for storage.

At the southern end of the room is another cluster of artifacts including seven corrugated sherds, and the skull of a rock squirrel (Probably a post-abandonment feature).

No definite activity concentrations are suggested by these clusters. This floor represents the middle section of a longer room which extended south into Room 6, Floor 2, and possibly north to the north wall of Room 4. The total length of the room, the lack of a firepit in this floor or in Floor 2 of Room 6, and the presence of a storage pot in the floor suggest that this long room might have been used as a storage room. The clusters of artifacts seen here might represent utility areas or trash accumulation in the room.

TABLE 34

Artifacts Found on Floor 1 of Room 5

Field No.	Artifact Decription
9-1	Utilized flake, Qe
9-2	Bones
9-3	Mancos B/W sherd
	Gray ware sherd
9-4	Two non-utilized flakes, Qe and Cy
9-5	End and side scraper, On
9-6	Two gray ware sherds
	Corrugated sherds
9-7	Three corrugated sherds
9-8	Three corrugated sherds
9-9	Corrugated sherd
9-10	Three Mancos B/W sherds
	Abajo R/O sherd
	Five white ware sherds
	Ten corrugated sherds
	Red ware sherd
9-11	Bone
9-12	Corrugated pot
9-13	Two gray ware sherds
	Mancos B/W sherd
	Corrugated sherd
9-14	Two corrugated sherds
	Gray ware sherd
9-15	Rock squirrel skull
9-16	Non-utilized flake, Qe
9-17	Three corrugated sherds
	Mesa Verde Corrugated sherd
9-18	Bone
9-19	Utilized flake, On
9-20	Bone

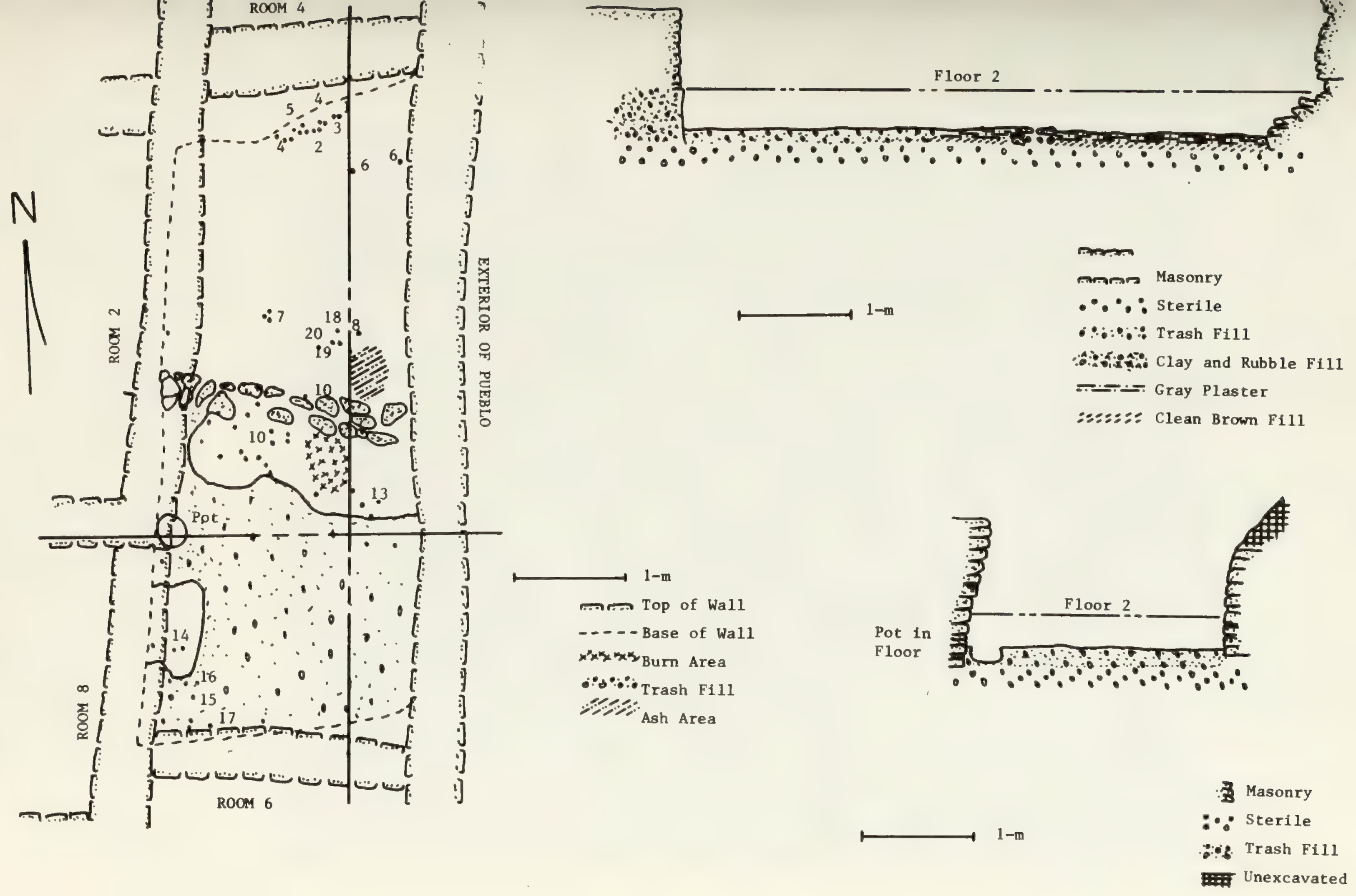


Figure 39: Plan and profiles of Floor 1 in Room 5.

Figure 40: View of Room 5 showing the cobble wall and corrugated pot set in the floor. The north half of the room is cleared to the base of the trash fill level.

Room 6, Floor 2 (Fig. 41, Table 35)

In the northwest quarter of the room is a large artifact concentration consisting mainly of sherds: 80 corrugated, 1 Mesa Verde Corrugated, 1 Mancos corrugated, 2 gray ware, 1 Mancos Black-on-white, 2 McElmo Black-on-white, 3 Tusayan Polychrome, and 1 white ware. The cluster also includes two bone fragments, one displaying butcher marks; an end and side scraper; a core-hammerstone; four chipped stone flakes, three of which were unutilized; and one utilized obsidian flake.

East of this cluster is a second cluster including two worked bone tools, an end scraper made from an Artiodactyla sp. scapula, the other a fragmentary worked piece. Also included in the group is another bone fragment, a deer phalanx displaying butcher marks, a hammerstone, an obsidian flake, and five corrugated sherds. This cluster may represent a manufacture area of some sore by the presence of the bone scraper, the utilized flake and the hammerstone.

A second large cluster of sherds lies south of the sherd cluster discussed above. Besides the 48 sherds, 32 of which are corrugated, there are 2 burned bone fragments and 1 flake.

In the southwest corner is a cluster of artifacts including a bone awl made from an Artiodactyla sp. metapodia, a fragmentary worked bone piece, an unutilized bone, and a core-hammerstone. This cluster may indicate an area used for bone tool manufacture.

The burned roof had fallen on top of the floor. The large accumulation of sherds on the floor may be explainable by vessels which had been suspended from the roof which had fallen onto the floor, then followed by the burned roof. This room is an extension of Floor 1 in Room 5 which as discussed above was probably used as

TABLE 35

Artifacts Found on Floor 2 of Room 6

Field No.	Artifact Description
31-1	Non-utilized flake, Qe
31-2	Utilized flake, Qe
31-3	Mancos Corrugated sherd
31-4	Corrugated sherd
31-5	Core hammerstone
31-6	Bone
31-7	Bone awl
31-8	Fragmentary worked bone
31-9	Corrugated sherd
31-10	Two corrugated sherds
31-11	Non-utilized flake, Qe
31-12	Mancos B/W sherd Mesa Verde Corrugated sherd
31-13	Tusayan Polychrome sherd
31-14	Corrugated sherd
31-15	Mancos Corrugated sherd, corrugated sherd, two Mancos B/W sherds, bone
31-16	Mancos Corrugated sherd, Mesa Verde Corrugated sherd, 24 Corrugated sherd 3 gray ware sherds, 5 Mancos B/W sherds
31-17	Two corrugated sherds
31-18	Two corrugated sherds McElmo B/W sherd
31-19	McElmo B/W sherd
31-20	Corrugated sherd
31-21	White ware sherd
31-22	Bone
31-23	Eight corrugated sherds
31-24	Bone fragments, 13 corrugated sherds, 1 Mancos B/W sherd
31-25	Five corrugated sherds
31-26	Non-utilized flake, Qe
31-27	Non-utilized flake, Qe
31-28	Utilized flake, On
31-29	Hammerstone
31-30	Two corrugated sherds
31-31	Three corrugated sherds
31-32	Bone scraper
31-33	Five corrugated sherds, Tusayan Polychrome sherd
31-34	Two Tusayan Polychrome sherds
31-35	22 corrugated sherds
31-36	Non-utilized flake, On
31-37	Four corrugated sherds
31-38	13 corrugated sherds, Snubnose scraper
31-39	Utilized flake, On
31-40	Utilized flake, On
31-41	Bone

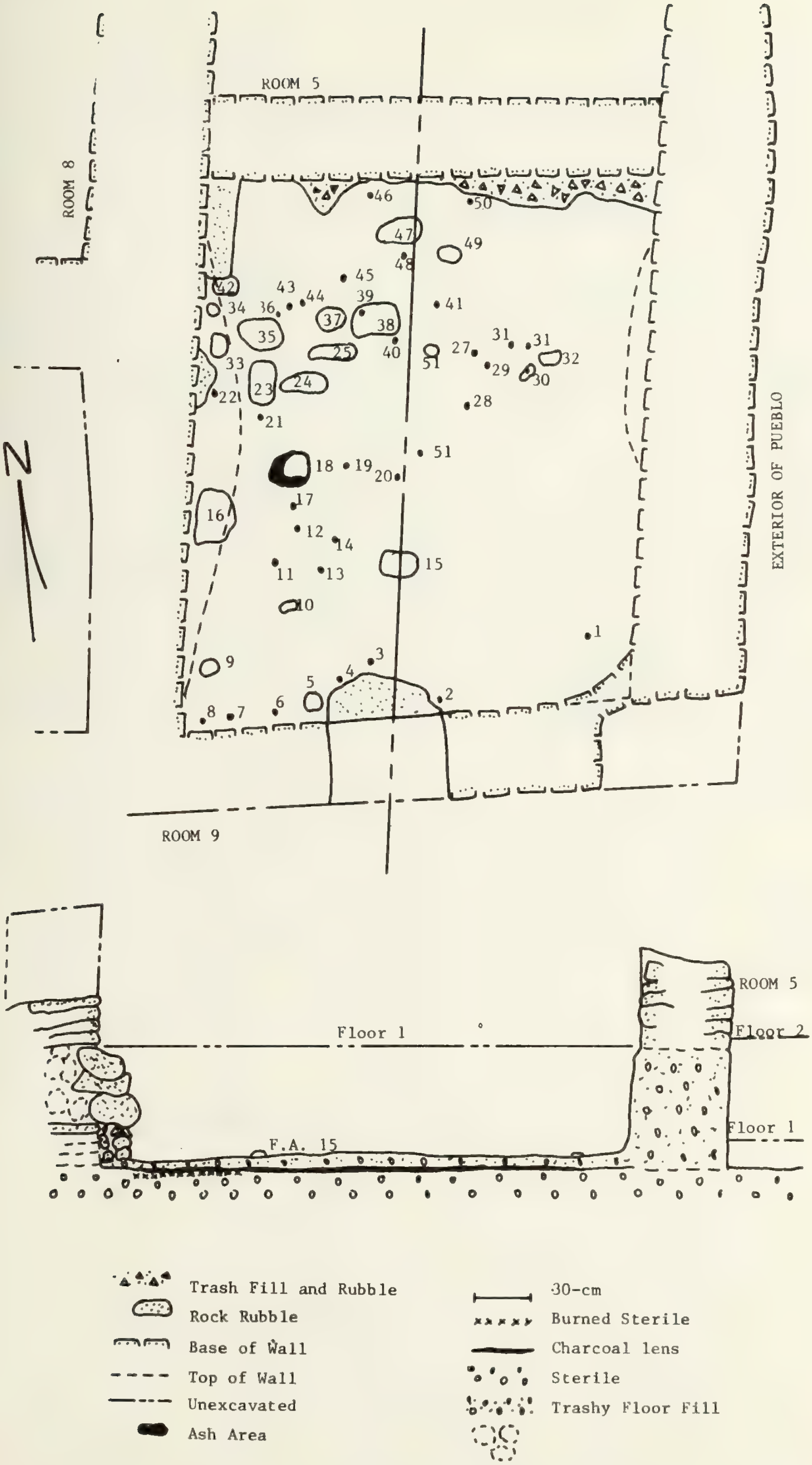


Figure 41: Plan and profile views of Floor 2 in Room 6.

TABLE 36

Artifacts Found on Floor 1 of Room 6

Field No.	Artifact Description
22-2	Non-utilized flake
22-3	Hammerstone rejuvination flake
22-4	Plain gray sherd
22-5	Two corrugated sherds
22-6	Two non-utilized quartzite flakes
22-7	Bone fragments; three Artiodactyla sp., fourteen unid. mammal
22-8	Mancos B/W sherd
	Tusayan Polychrome sherd
22-9	Bone fragment
22-10	Mesa Verde Corrugated sherd
22-11	Bone fragment
22-12	Bone fragment
22-13	Two Mancos B/W sherd
	Bone fragment
	Non-utilized sherd, Qe
22-14	Mancos B/W sherd
22-15	Non-utilized flake, Qe
22-16	Corrugated sherd
22-17	White ware sherd

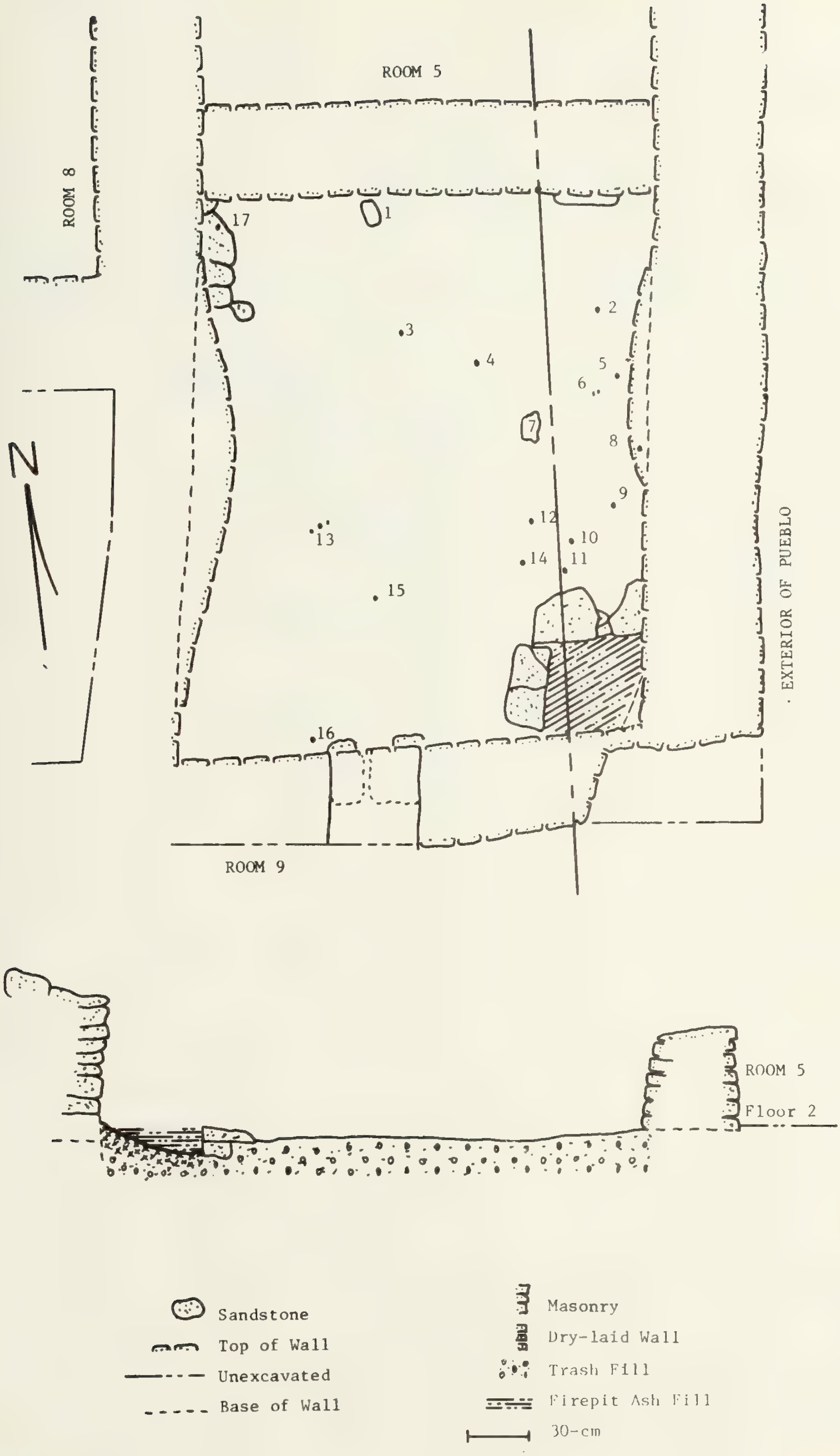


Figure 42: Plan and profile views of Floor 1 in Room 6.

TABLE 37

Artifacts Found on Floor 1 of Room 8

Field No.	Artifact Description
34-1	Two bones
34-2	White ware sherd
34-3	Two gray ware sherds
34-4	Corrugated sherd
34-5	Corrugated sherd
34-6	Corrugated sherd
34-7	Three white ware sherds
34-8	Corrugated sherd
34-9	Two gray ware sherds
34-10	Bone
34-11	Two gray ware sherds
34-12	White ware sherd
34-13	Corrugated sherd
34-14	Three corrugated sherds
34-15	McElmo B/W sherd
34-16	White ware sherd
34-17	White ware sherd
	Bone
34-18	Mancos B/W sherd
34-19	Corrugated sherd
34-20	Corrugated sherd
34-21	Bone
34-22	Mancos Corrugated jar, partial pot
34-23	Bone weaving tool
34-24	Nine Tusayan B/R sherds
34-25	Mancos B/W sherd
34-26	Two Mancos B/W sherds
	Mesa Verde Corrugated sherds
	Five corrugated sherds
	Gray ware sherd
34-27	Non-utilized flake Qe
34-28	Non-utilized flake On
34-29	Mano
34-30	Projectile point
34-31	Mano fragment
34-32	Worked sherd

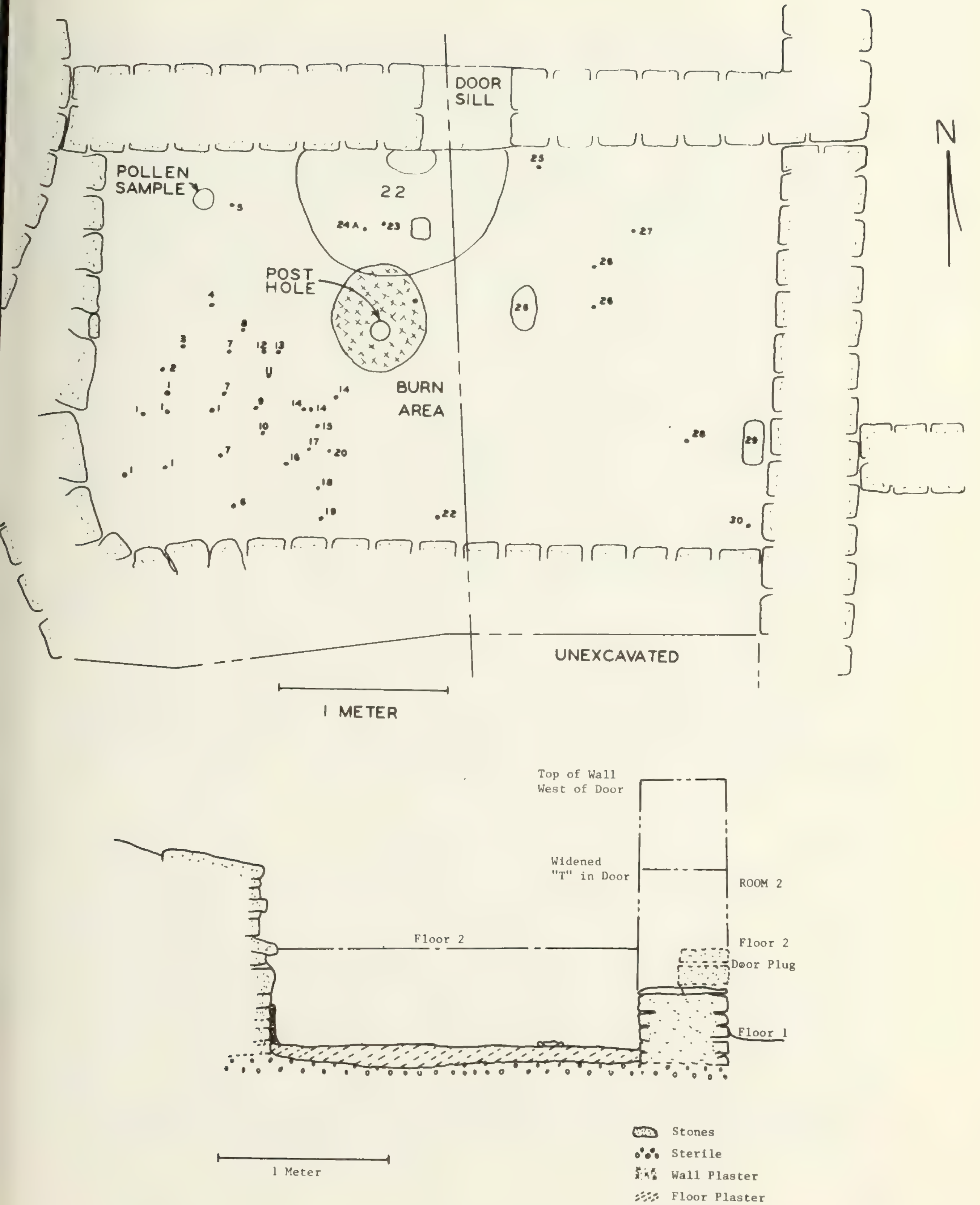


Figure 43: Plan and profile view of Room 8 showing Floor 1.

a storage room. The evidence of the abundance of artifacts on this floor compared with the Room 5, Floor 1 (Fig. 49) suggests that the vessels had been suspended from the ceiling in this part of the room. It also appears that the floor in Room 6 had been used for the manufacture of bone tools. It is suggested that this location close to the door in the south wall of Room 6 would have provided good or adequate light for this project compared to the use of the room further to the north (in the area designated Room 5, Floor 1) which would have had poorer light.

Room 6, Floor 1 (Fig. 42, Table 36)

This floor was used as a living surface by evidence of the firepit in the corner of the floor. Few artifacts are associated with the floor, most of these being sherds and bone fragments, with six flakes, only one of which is utilized.

One artifact cluster, extending north from the firepit, included 6 sherds, 2 flakes, and 30 bone fragments most of which were found together in a group. This cluster may represent bone refuse from a meal. Surrounding the cluster in the center of the room were four flakes, one of which was used.

Room 8

Room 8 (Fig. 43, Table 37) shows two artifact clusters, one of bones in the southwest corner and adjoining it, lying directly west, is a large cluster of sherds with a few bones mixed in. The sherd cluster includes eight corrugated, nine unidentified whiteware, four unidentified grayware, and one Mancos Black-on-white sherd.

Along the center of the north wall extending before the doorway is a collection of Mancos Corrugated sherds representing a

partially restorable vessel. Also within this area are nine Tusayan Black-on-red sherds. In this same area is a weaving tool with a broken tip, a unifacial mano fragment, and a worked McElmo Black-on-white sherd. The sherd is chipped into a circular form and two places on the edge show grinding either from use in that form or from the uncompleted manufacture area where the mano fragment might have been used to grind the edges of the sherd and to regrind the broken weaving tool.

A second worked sherd, a Mancos Black-on-white is located to the east in the sherd cluster, F.A. 26, which is within reaching distance from the above mentioned cluster. This sherd shows grinding perpendicular to the edge. Possibly it was being ground at this location by use or manufacture.

On the remainder of the floor surface are a few random artifacts. Two of these are chipped stone flakes, one of fine quartzite, one of obisdian. Both are unutilized.

In the southeast corner is a bifacial rectangular mano and a point (long, side notched, square based, Fig. 17h) which shows evidence of use as a drill and a knife with the base having been ground for hafting.

The evidence of the artifacts indicates the use of this room as a work area.

Room 9, Floor 3

Figure 44 and Table 38 show the location of artifacts on Floor 3 of Room 9. There are five artifact clusters on the floor extending across the center of the room around the firepit and the large ash pit. One is located around the edges of the firepit consisting of 23 sherds, 3 flakes and the base of a biface reused

TABLE 38

Artifacts Found on Floor 3 of Room 9

Field No.	Artifact Description
41-1	Mancos B/W sherd
41-2	Mancos B/W sherd
41-3	Bone
41-4	Corrugated sherd
41-5	Three bones
41-6	Corrugated sherd Gray ware sherd Mancos B/W sherd White ware sherd
41-7	Utilized flake, Ct
41-8	Mancos B/W sherd
41-9	Mancos B/W sherd
41-10	Ground stone
41-11	Bone
41-12	Tusayan Polychrome sherd
41-13	Mancos B/W sherd
41-14	Red ware sherd
41-15	Gray ware pipe fragment
41-16	Bone
41-17	Mancos B/W sherd Two corrugated sherds Gray ware sherd White ware sherd
41-18	Mancos B/W sherd
41-19	Two Mancos B/W sherds
41-20	Non-utilized flake, Qe
41-21	Two corrugated sherds Gray ware sherd Mancos B/W sherd
41-22	Knife base
41-23	Mancos B/W sherd
41-24	Utilized flake, Ze
41-25	Corrugated sherd
41-26	Non-utilized flake, Ct.
41-27	Three non-utilized flakes, Ct, Qe, FQe
41-28	Two McElmo B/W sherds
41-29	Two bones, turkey skull fragment, small mammal fragment
41-30	Plain gray ware
41-31	Non-utilized flake, fQe
41-32	Two small mammal bone fragments
41-33	White ware sherd
41-34	McElmo B/W sherd
41-35	Jackrabbit left ulna
41-36	3 *Artiodactyla* sp. fragments, 4 small mammal fragments
41-37	Mancos B/W sherd, 6 corrugated sherds
41-38	Non-utilized flake, fQe
41-39	McElmo B/W jar sherd, corrugated sherd
41-40	Bone
41-41	Utilized flake, On
41-42	2 *Artiodactyla* sp. bone fragments
41-43	7 corrugated sherds Gray ware sherd 2 Mancos B/W sherds 2 McElmo B/W sherds White ware sherd
41-44	Mancos B/W sherd White ware sherd

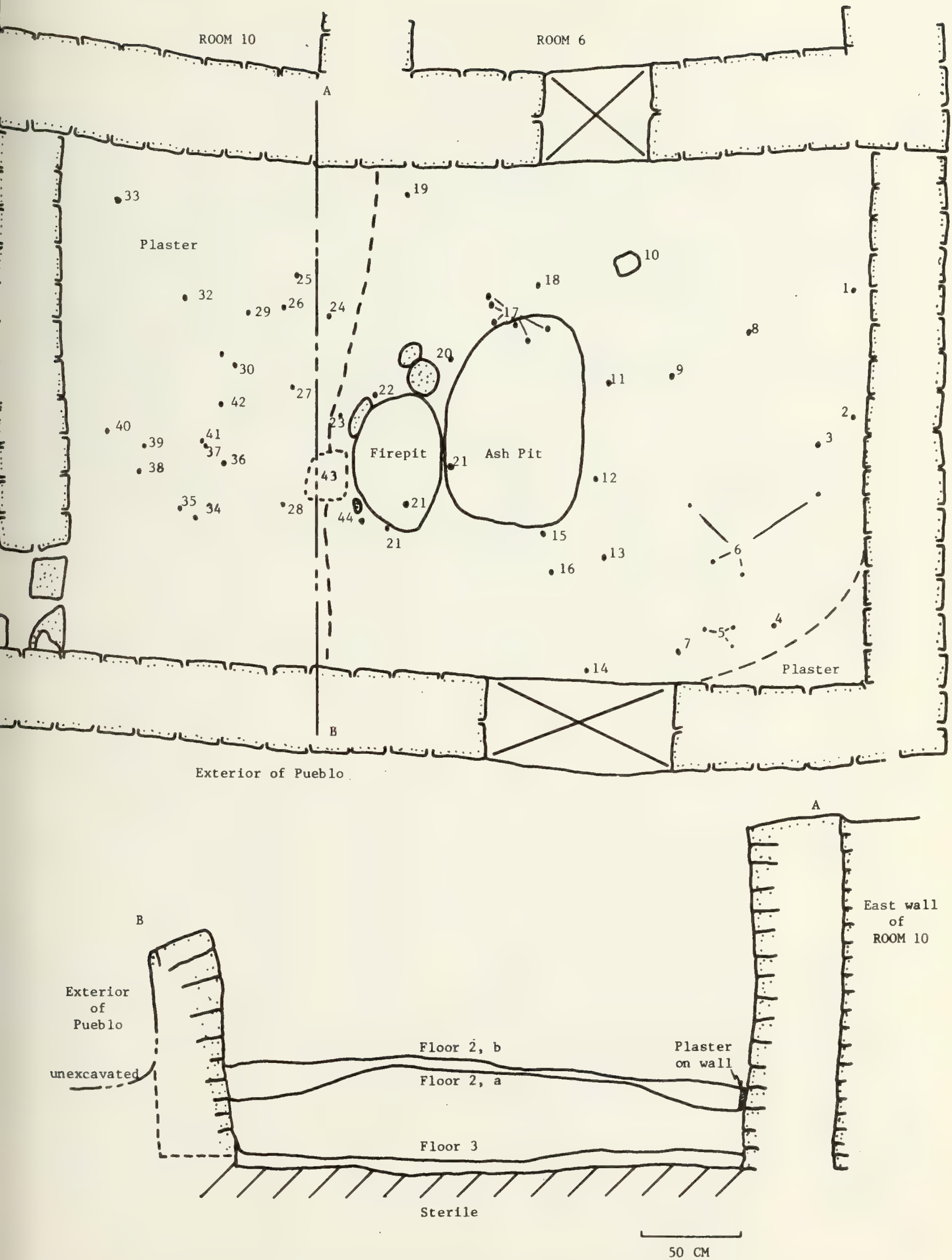


Figure 44: Plan and profile views of Floor 3 in Room 9.

TABLE 39

Artifacts Found on Floor 1 of Room 9A

Field No.	Artifact Description
118-1	McElmo B/W bowl sherd
118-2	Non-utilized flake,fQe
118-3	3 uncl. corrugated sherds
118-4	McElmo B/W bowl sherd
118-5	Uncl. white ware bowl sherd
118-6	Bone
118-7	Mancos B/W bowl sherd+
118-8	Mancos B/W bowl sherd+
118-9	Mancos B/W bowl sherd#
118-10	McElmo B/W jar sherd*
118-11	Side notched axe, FePy
118-12	Non-utilized flake, SS
118-13	McElmo B/W jar sherd*
118-14	3 McElmo B/W jar sherds*
118-15	McElmo B/W jar sherd*
118-16	McElmo B/W jar sherd*
118-17	Non-utilized flake, fQe
118-18	Non-utilized flake, fQe
118-19	McElmo B/W jar sherd*
118-20	McElmo B/W jar sherd*
118-21	McElmo B/W jar sherd*
118-22	Core chopper, Ct
118-23	Uncl. white ware jar sherd*
118-24	Uncl. white ware bowl sherd
118-25	Mancos B/W bowl sherd#
118-26	McElmo B/W jar sherd*
118-27	3 McElmo B/W jar sherd*
118-28	3 McElmo B/W jar sherd*
118-29	Non-utilized flake, fQe Mesa Verde B/W jar sherd uncl. corrugated sherd
118-30	Flake scraper, fQe
118-31	Anvil
118-32	McElmo B/W bowl sherd
118-33	Flake scraper, On
118-34	½ glycimeris shell bracelet
118-35	Non-utilized flake, Qe
118-36	McElmo B/W jar sherd
118-37	Mancos B/W bowl sherd+
118-38	2 non-utilized flakes, fQe
118-39	McElmo B/W jar sherd
118-40	3 McElmo B/W jar sherds*
118-41	McElmo B/W jar sherds
118-42	Slab mano
118-43	Uncl. white ware bowl sherds
118-44	Core, fQe
118-45	Slab metate
118-46	Not artifact
118-47	Non-utilized flake, Ct
118-48	Uncl. white ware jar sherd
118-49	Uncl. white ware jar sherd
118-50	Non-utilized flake, On
118-51	Uncl. white ware bowl sherd
118-52	Non-utilized flake, fQe
118-53	Non-utilized flake, On
118-54	Uncl. white ware bowl sherd
118-55	Non-utilized flake, On
118-56	2 uncl. white ware bowl sherds
118-57	Non-utilized flake, Qe

+ from the same Mancos B/W bowl
# from the same Mancos B/W bowl
* from the same McElmo B/W bowl

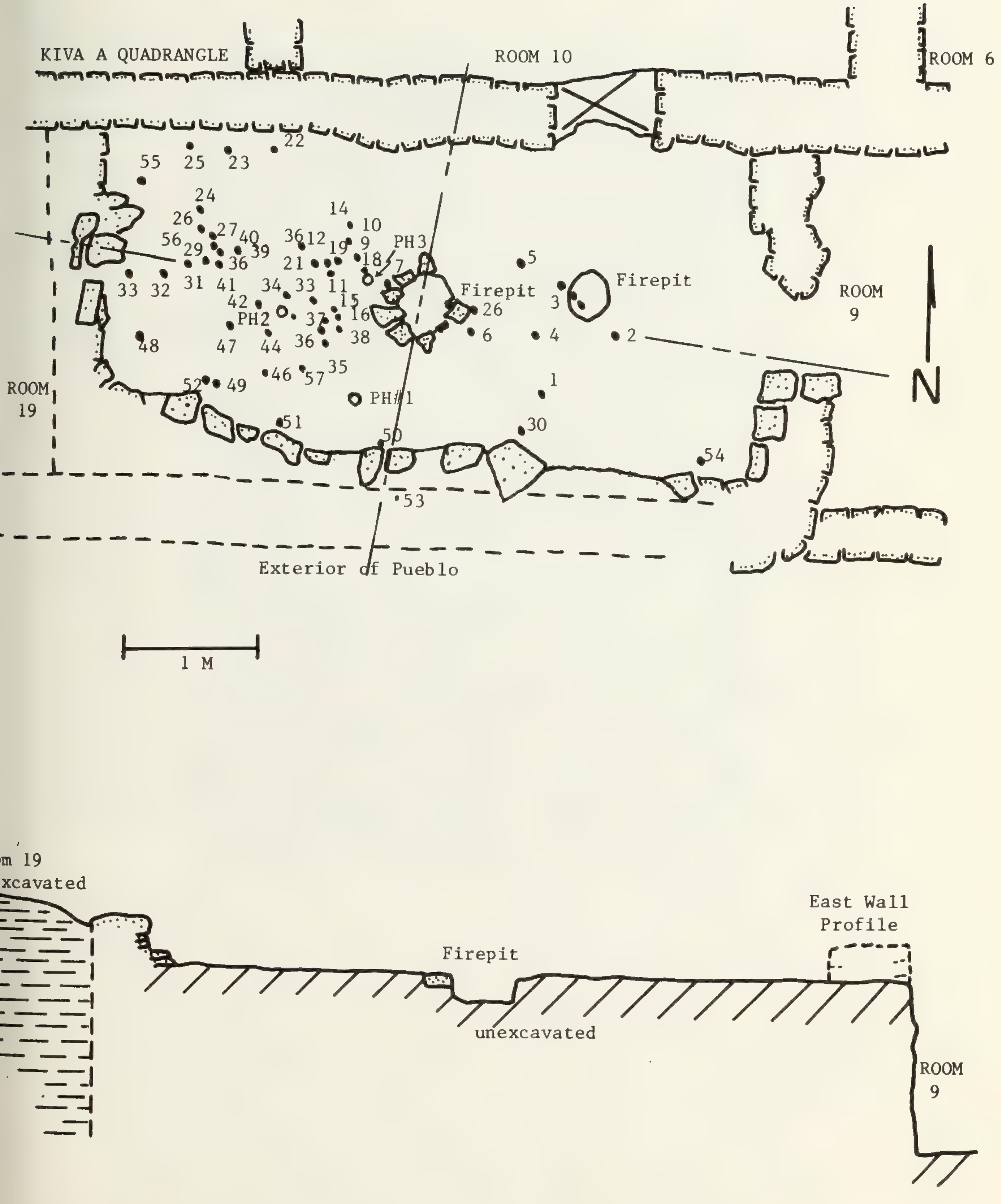


Figure 45: Plan and profile views of Room 9A.

as a scraper. One large cluster is located to the west of the firepit (twelve sherds, fourteen bones, and three flakes). One cluster of six sherds, one ground stone, and one flake lies to the north of the ash pit. A cluster of seven sherds including half of a plain gray ware pipe sherd (Fig. 16a) and one bone lies to the east of the ash pit. The last cluster is two sherds, three bones and one flake which lie along the south wall at the east corner. Seven other isolated artifacts lie across the floor.

The abundance of sherds and bone on the floor probably reflects a food preparation area as already indicated by the floor features and architectural evidence.

Room 9A, Floor 1 (Figs. 45-46, Table 39)

There are three artifact clusters on the floor and nineteen isolated artifacts. The three main clusters on the floor are in the western half of the room. One cluster close to the west wall has fourteen sherds from five different vessels, two flakes and one anvil. Two clusters lie to the west of the central firepit. The cluster further north has nine sherds, one flake, and a side-notched axe. The cluster to the south consisted of five flakes, a core, a slab mano, two sherds and one-half of a glycymeris bracelet. The remainder of the floor has scattered artifacts including twelve sherds, six flakes, one bone, and a slab mano.

This floor shows evidence of multiple uses including grinding food products, a flake working area, and abundant sherds suggesting food preparation or consumption. Some sections of the floor in the east half of the room are relatively free of artifacts, and this section might have been used as a living area for sitting or sleeping.

Figure 46: Floor 1 in Room 9A.

Room 10, Floor 1

There are three artifact clusters on the floor and a few isolated artifacts. One large artifact cluster lying in the southeast corner includes six corrugated sherds, one Mancos Black-on-white sherd, and one obsidian flake used as a knife. A group of artifacts to the north of the firepit includes two fine quartzite flakes, one used as a scraper, one fragmentary worked bone, and three sherds. A group of four fine quartzite flakes, one of which has been used as a scraper, is located at the western edge of the firepit. Along the south wall is a cluster of artifacts including a door slab, a grooved abrader and two bones. The isolated artifacts on the floor include three fine quartzite flakes and a white ware sherd.

The door slab was evidently stored at this location for use in the door in the south wall. The grooved abrader with two broad shallow grooves in one surface and evidence of anvil use on the other surface, was probably used in the room but was placed at this location for storage. The other artifacts and the presence of a firepit suggest that the room was used for food preparation and for a living space. The room was probably also used as a work room by evidence of the grooved abrader, but this activity is only suggested by the storage of the abrader in the room.

Room 10, Floor 2 (Figs. 47-50, Table 40)

The artifacts on the floor are located in six clusters with a single isolated artifact. One cluster is in the west pit; one is on the floor to the south of the west pit; one is on the floor between the two pits; one is within Feature 2; one large cluster is in the east pit below Feature 1; and the last is on the floor to the south of the east pit.

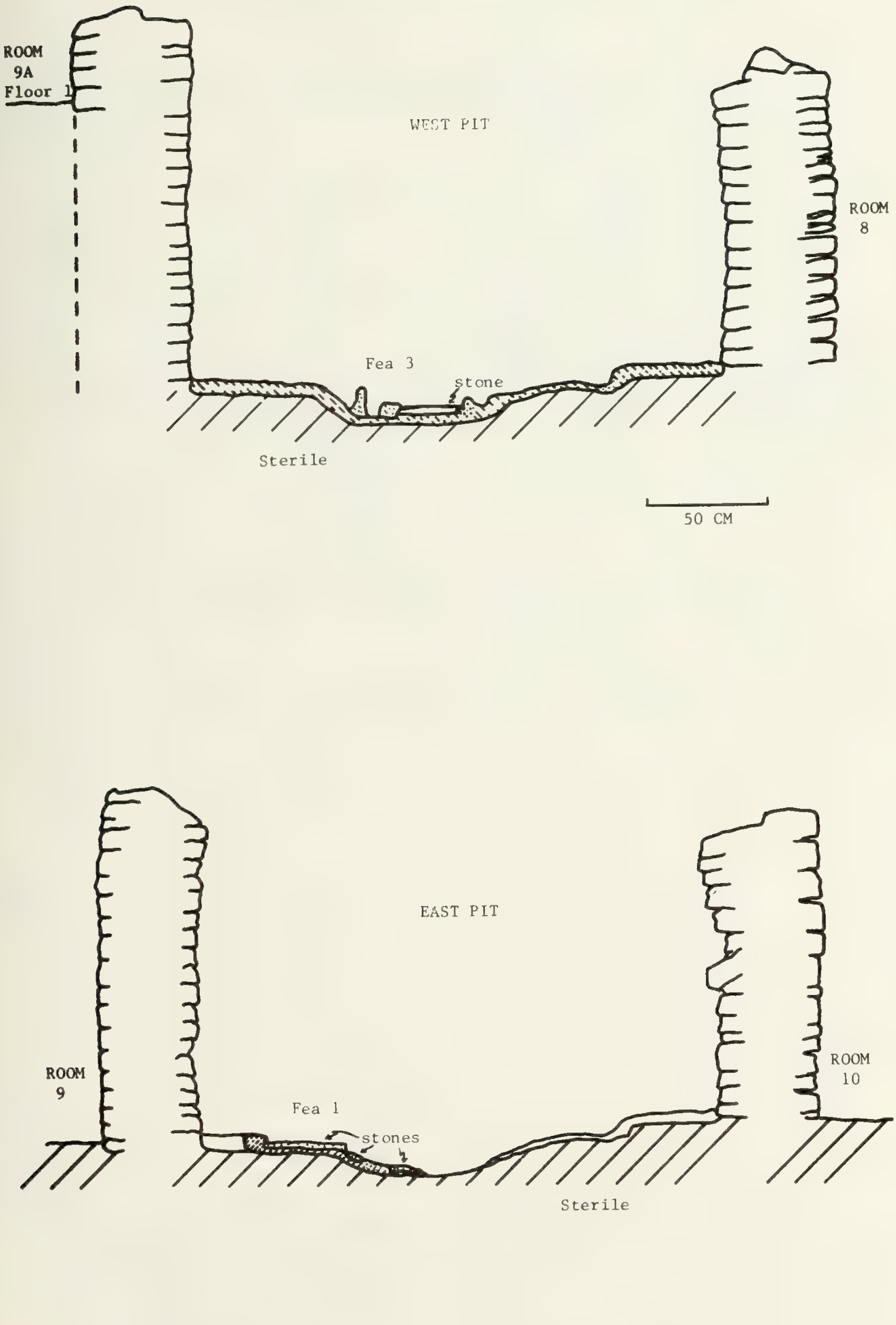


Figure 47: Profiles of Room 10, Floor 2.

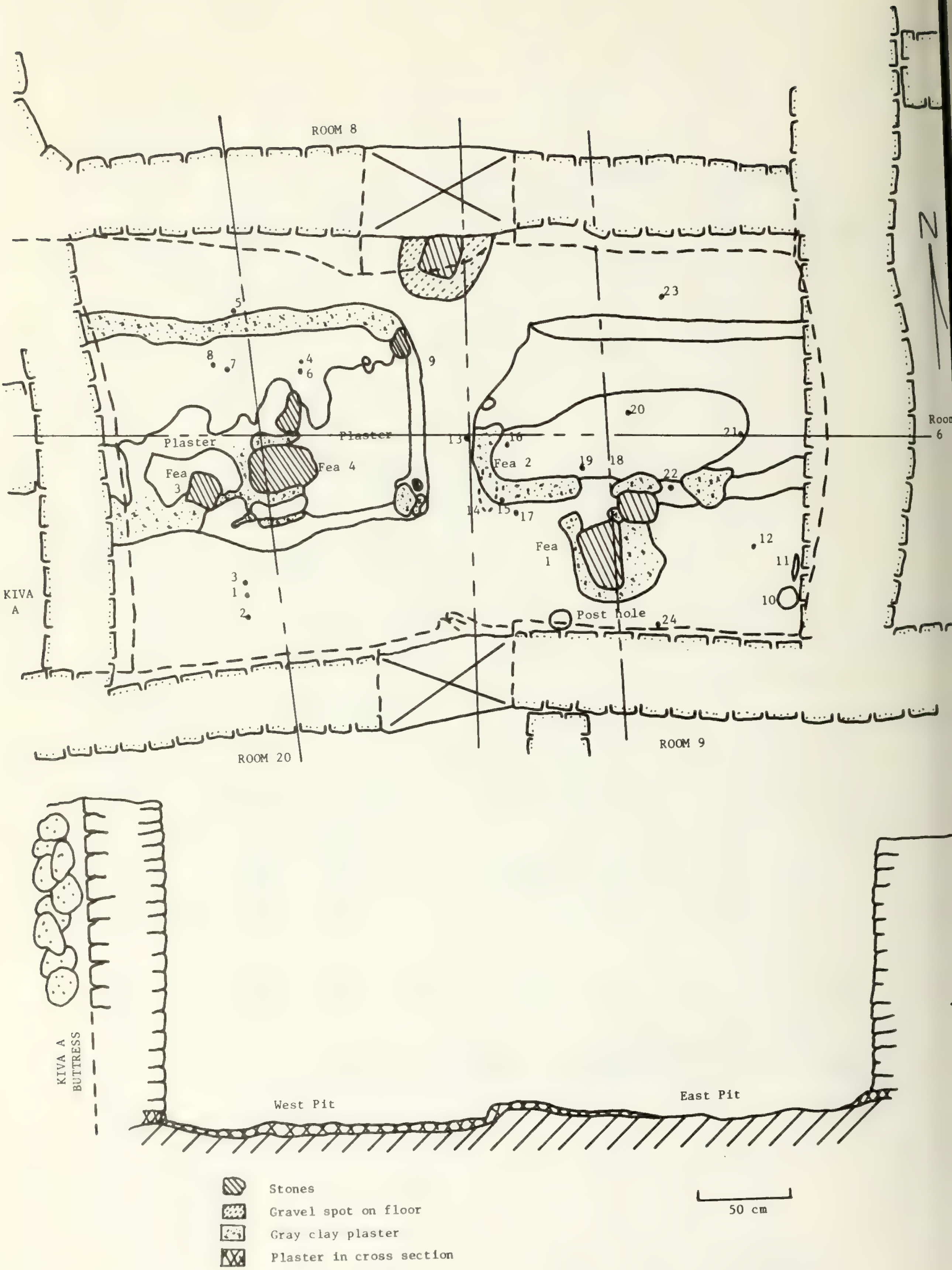


Figure 47 (Continued): Plan and profiles of Room 10, Floor 2.

TABLE 40

Artifacts Found on Floor 2 of Room 10

Field No.	Artifact Description
160-1	Grooved axe, fQe
160-2	Deer bone, left metacarpal
160-3	Mesa Verde Corrugated jar sherd
160-4	Grooved axe, fQe
160-5	McElmo B/W bowl sherd Uncl. white ware bowl sherd Three uncl. corrugated sherds
160-6	Four McElmo B/W bowl sherds
160-7	Bone bundle; 7 cottontail, 1 humerous, 5 tibias, 1 mandible frag., 1 Artiodactyla sp. awl tip, rodent pelvis, raven left ulna
160-8	Two uncl. corrugated sherds
160-9	Turkey bone tube, 8 cottontail bones, 1 unid. bone fragment
160-10	Two Tusayan Polychrome bowl sherds
160-11	Artiodactyla sp. splinter awl, prong-horn metacarpal, Artiodactyla sp. bone fragment
160-12	Medicine B/R jar sherd
160-13	Two Tusayan Polychrome, variety B bowl sherds, two uncl. red ware sherds
160-14	Five McElmo B/W bowl sherds
160-15	Grinding stone
160-16	Two core hammerstones, Qe and fQe
160-17	Three McElmo B/W bowl sherds
160-18	Utilized flake, On
160-19	Two Flagstaff B/W bowl sherds, Tusayan B/R jar sherd, Tusayan Polychrome Variety A bowl sherd, uncl. white ware jar sherd
160-20	Non-utilized flake, Qe
160-21	Jet pendant
160-22	Projectile point, Ct
160-23	Slab mano

Figure 48: View of Floor 2 in Room 10 showing the two large pits in the west and east halves of the room.

Figure 49: Close view of Feature 1 at the edge of the east pit in Floor 2 of Room 10.

Figure 50: Close view of Feature 3 and 4 in the west pit in Floor 2 of Room 10.

The fill above the floor was a thick trash layer with many artifacts including portions of sixteen identifiable vessels. Seventeen of the sherds on the floor are identifiable as being from these vessels, including sherds from F.A. 5, 6, 12, 13, 14, and 19. This indicates that these ceramics are part of the trash accumulation which happen to rest on the floor rather than indicative of the use of the floor. Probably a portion of the remainder of the artifacts on the floor, such as the corrugated sherds and bones, may also be attributable to trash fill resting on the floor.

The evidence of the floor features suggest that this room had been used as a grinding room and that the grinding bins had been removed from the floor before the room was used for a trash deposit. Some artifacts located on the floor might have been used in the grinding process and were left on the floor at the abandonment such as: F.A. 1 and 4, two axes, both displaying hammer use, located in and at the edge of the east pit; two core-hammerstones, F.A. 16, located in Feature 6 of the west pit; a grinding stone, F.A. 15, with some use on all sides but heavy use on one side; and a slab mano located on the floor north of the west pit, F.A. 23.

Room 20, Floor 2 (Fig. 51-57, Table 41)

There are two artifact clusters in the southeast part of the room and five other isolated artifacts across the floor. One cluster, lying south of Feature 6, contains fifteen sherds representing at least five different vessels, and one chert flake. The small cluster along the south wall contains bone fragments from turkey, jackrabbit, and cottontail, and four sherds. The other isolated floor artifacts include deer bone fragments, a chert flake, a sherd and a mano.

TABLE 41

Artifacts Found on Floor 2 of Room 20

Field No.	Artifact Description
292-1	McElmo B/W sherd
	Four uncl. corrugated sherds
	Two uncl. gray ware sherds
	Uncl. white ware jar sherd
292-2	Flagstaff B/W bowl sherd
	Two uncl. corrugated sherds
292-3	McElmo B/W bowl sherd
	Uncl. corrugated sherd
292-4	Non-utilized flake, Ct
292-5	Unid. B/R bowl sherd
292-6	Unid. B/W jar sherd
292-7	Flagstaff B/W bowl sherd
292-8	Non-utilized flake, Ct
292-9	Three turkey bones, jackrabbit bone, Three unid. small mammal bones
292-10	Unid. red ware bowl sherd
292-11	Slab mano
292-12	McElmo B/W bowl sherd
	Uncl. white ware bowl sherd
	Uncl. Tsegi red ware bowl sherd
292-13	Two jackrabbit bones, one cottontail bone, two turkey bones, two unid. bone fragments
292-14	Two unid. bone fragments
292-15	Deer bone, four <u>Artiodactyla</u> sp. bones

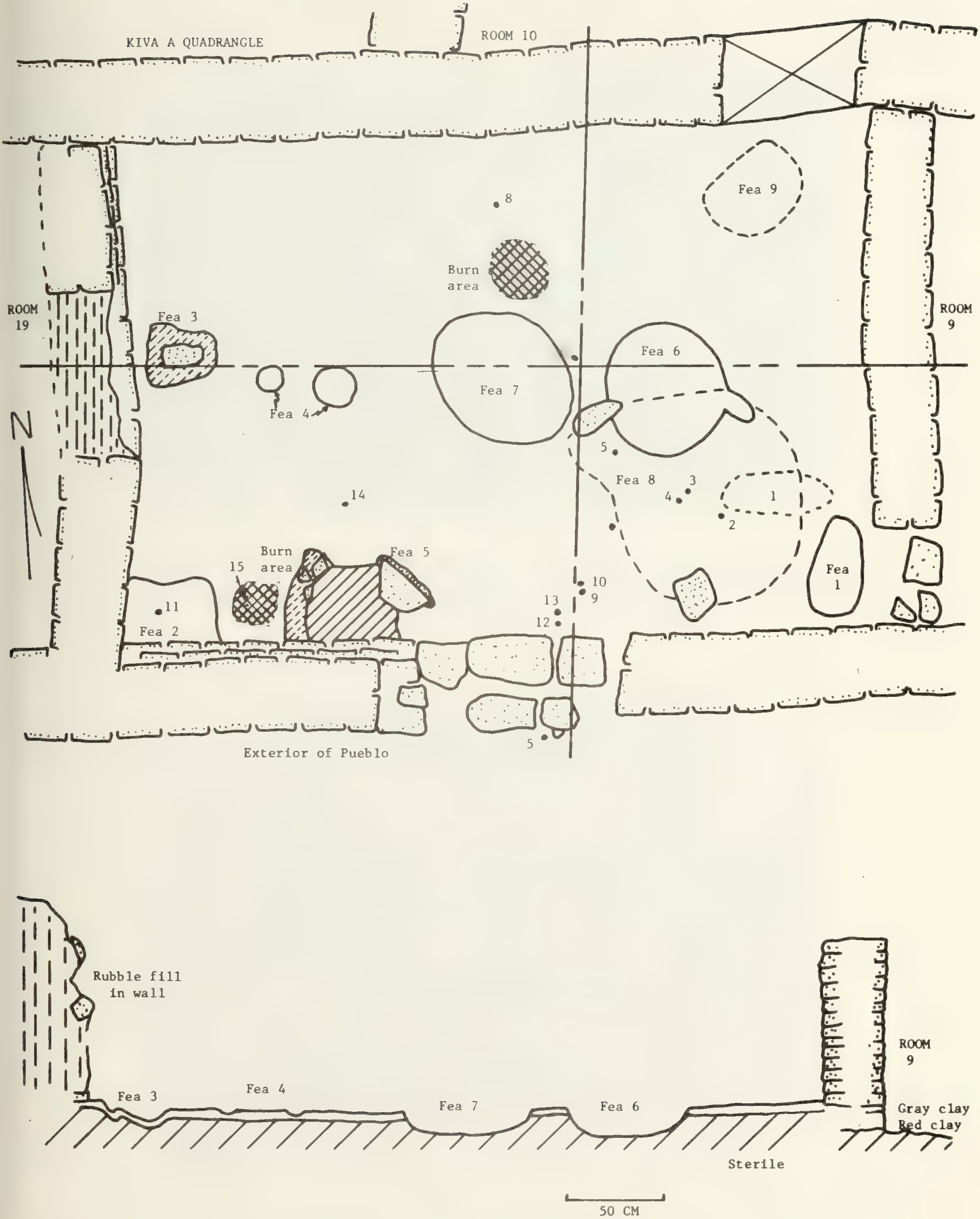


Figure 51: Plan and profile of Floor 2 in Room 20.

Figure 52: North wall of Room 20 showing the T-shaped door which opens to Room 10.

Figure 53: The east wall of Room 20 showing the break at the south end.

Figure 54: The west wall of Room 20 showing the wall fill slumped in the top of the wall break.

Figure 55: View of Floor 2 in Room 20.

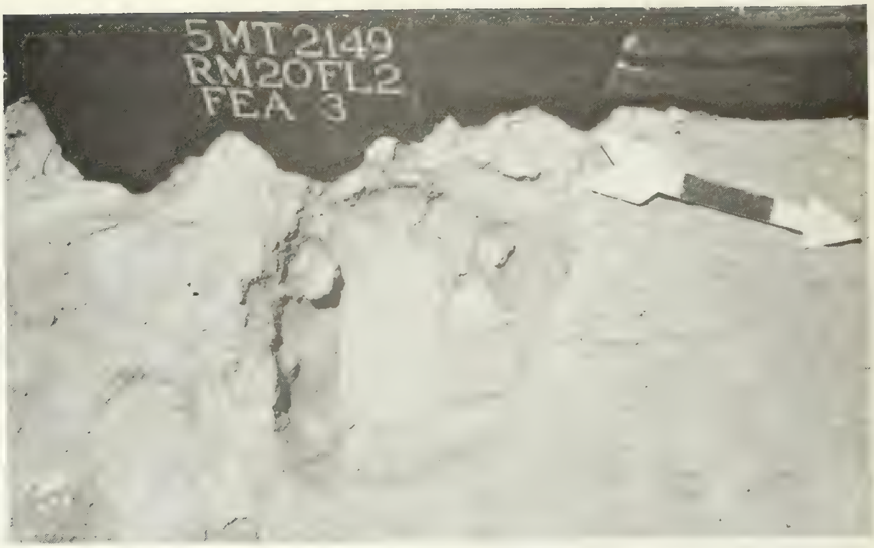


Figure 56: Close view of Feature 3 in Floor 2 of Room 20.

Figure 57: View of the subfloor Feature 8 extending from Feature 6 in Floor 2 of Room 10.

The evidence of the floor artifacts reinforce the interpretation evidenced by the floor features that the room was used for the cooking and preparation of food.

Kiva A (Figs. 58-67, Table 43)

The distribution of the artifacts indicates two stone working areas. The first is in the southeast section extending from Pilaster 7 to the bench recess before Pilaster 8. This cluster includes three projectile point blanks, two cobble choppers, both unutilized, thirteen flakes, and eight corrugated sherds.

The second lithic work area lies along the northwest edge of the kiva from Pilaster 3 to half way between Pilasters 4 and 5. This cluster, all of quartzite, includes a polishing stone showing use on one face, a flake displaying chopping use, and seven other flakes, one of which is utilized. Three sherds were also associated in this cluster.

A third artifact cluster is in the eastern half of the kiva before Pilaster 6. This is a large cluster of bone fragments with a few sherds.

A number of artifacts are located on bench contact, the majority of which are bone fragments. These are scattered along the entire bench but concentrations occurred on the bench above the floor artifact cluster areas. The exception to this is the bone cluster on the bench between Pilaster 5 and 6, which has no artifacts on the floor below it but lies within reaching distance from the cluster on the floor before Pilaster 6. Also located on the bench is a projectile point fragment, a chalcedony flake, two sherds and a bone awl.

The bones found on the bench and floor represented minimum numbers of one individual each of mule deer, pronghorn antelope,

TABLE 42

Artifacts Found on Floor 1 of Kiva A

Field No.	Artifact Description
5-1	Bone
5-2	1 grayware sherd
5-3	1 corrugated sherd
5-4	Non-utilized flake, Cy
5-5	Projectile point fragment
5-6	Non-utilized flake, On
5-7	Projectile point
5-8	Utilized flake, Cy
5-9	Projectile point
5-10	Hammerstone rejuvenation flake, Qe
5-11	Chopper, Qe
5-12	Projectile point
5-13	Non-utilized flake, Qe
5-14	2 corrugated sherds
5-15	1 whiteware sherd
5-16	1 corrugated sherd
5-17	Bone
5-18	Bone awl
5-19	Bone
5-20	3 whiteware sherds
5-21	1 Mancos B/W sherd, 3 corrugated sherds
5-22	2 non-utilized flakes, 1 Qe, 1 Cy
5-23	1 non-utilized flake, Qe
5-24	3 non-utilized flakes
5-25	1 corrugated sherd
5-26	1 non-utilized flake, Qe
5-27	1 non-utilized flake, Qe
5-28	1 corrugated sherd
5-29	Chopper, Qe
5-30	1 non-utilized flake, Qe
5-31	Denticulate edge scraper
5-32	Mancos B/W sherd
5-33	Polishing pebble
5-34	1 non-utilized flake, Qe
5-35	1 non-utilized flake, Qe
5-36	1 non-utilized flake, Qe
5-37	1 non-utilized flake, Qe
5-38	Chopper flake
5-39	Mancos B/W sherd
5-40	1 corrugated sherd
5-41	1 non-utilized flake, Qe
5-42	1 corrugated sherd
5-43	1 non-utilized flake, Qe
5-44	1 corrugated sherd
5-45	1 non-utilized flake, Qe
5-46	1 non-utilized flake, Se
5-47	1 redware sherd
5-48	4 corrugated sherds
5-49	Sandstone shaped slab
5-50	Grinding slab fragment
5-51	1 corrugated sherd
5-52	1 grayware pot base

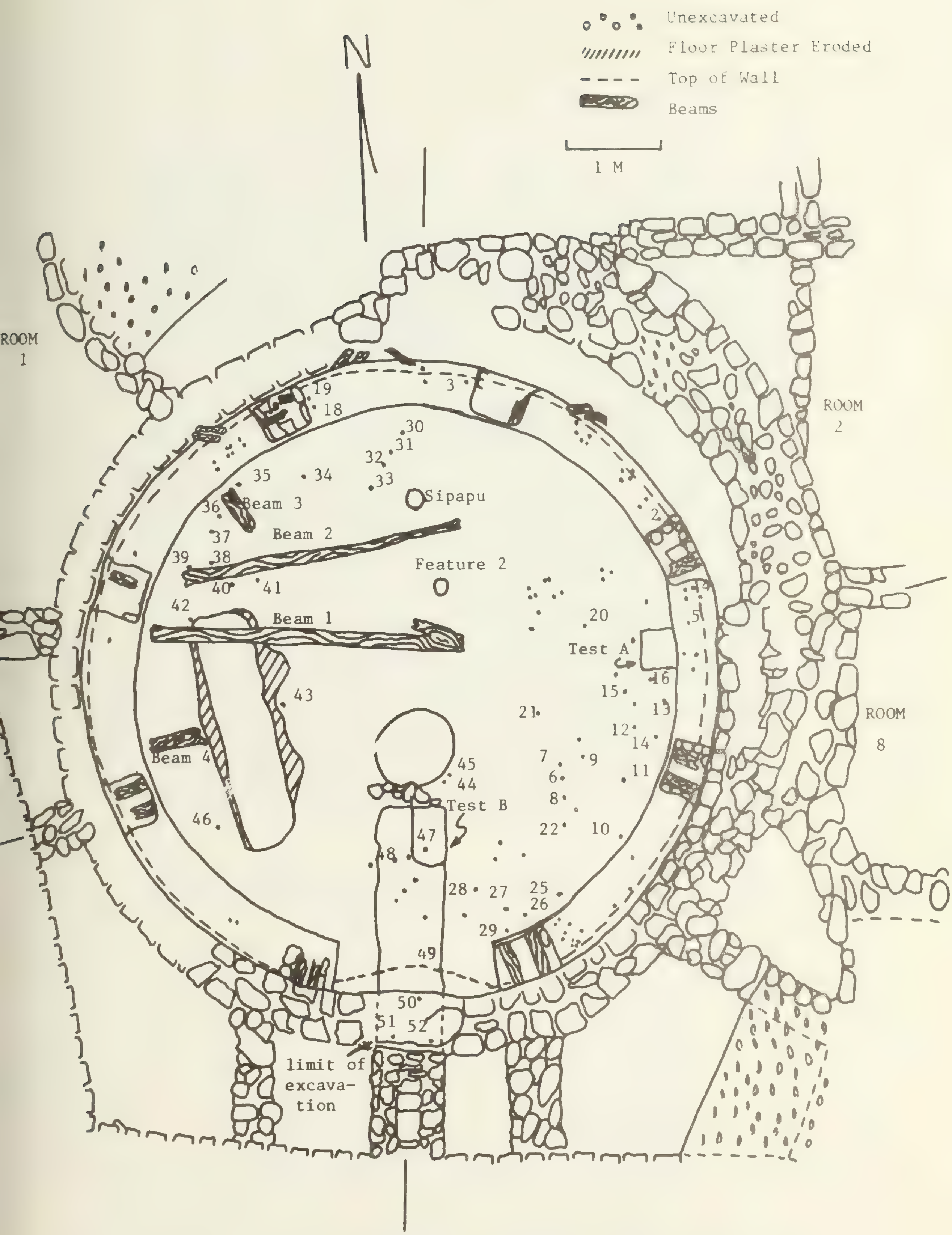


Figure 58: Map of Kiva A and the surrounding quadrangle.

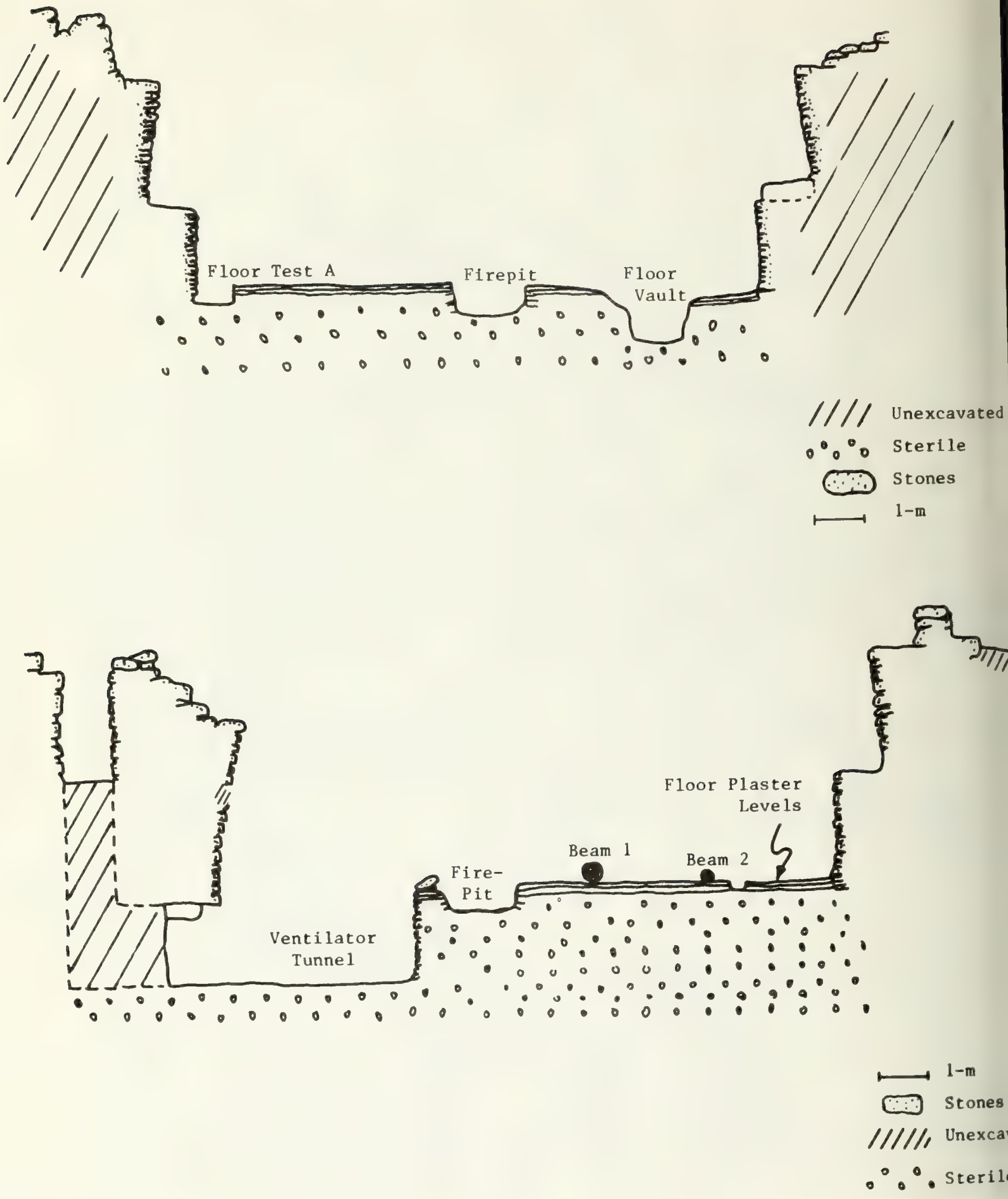


Figure 59: Kiva A profiles. The profiles shown from top to botton: east-west profile, south-north profile.

Figure 60: The crescent shaped wall at the northeast side of Kiva A.

Figure 61: Kiva A floor and floor features.

Figure 62: View in Kiva A of the remains of beams extending from the wall sockets and resting on Pilaster 4. The river cobble wall repair is seen in the wall.

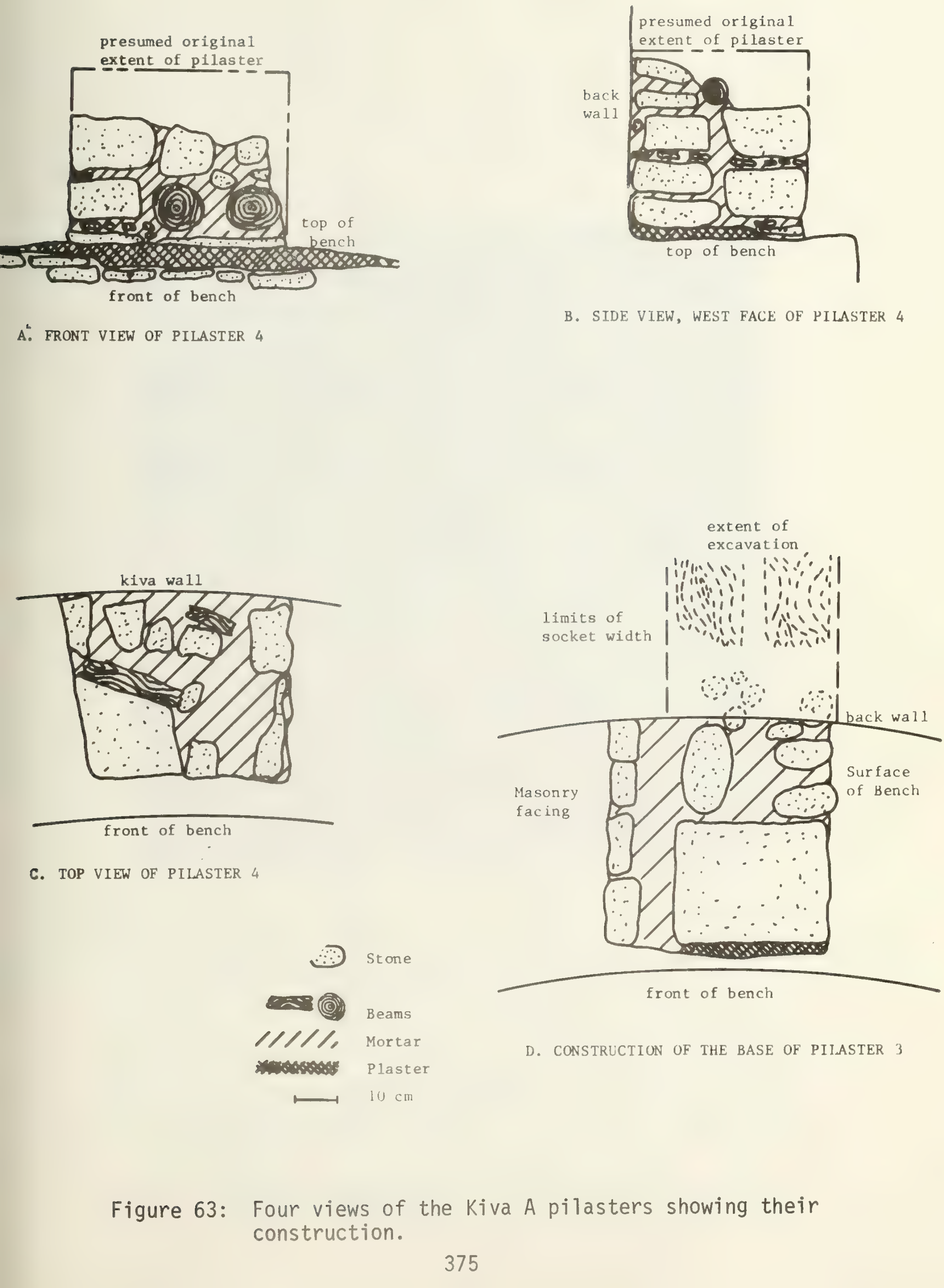


Figure 63: Four views of the Kiva A pilasters showing their construction.

Figure 64: Pilaster 4 in Kiva A, cleared and partially excavated.

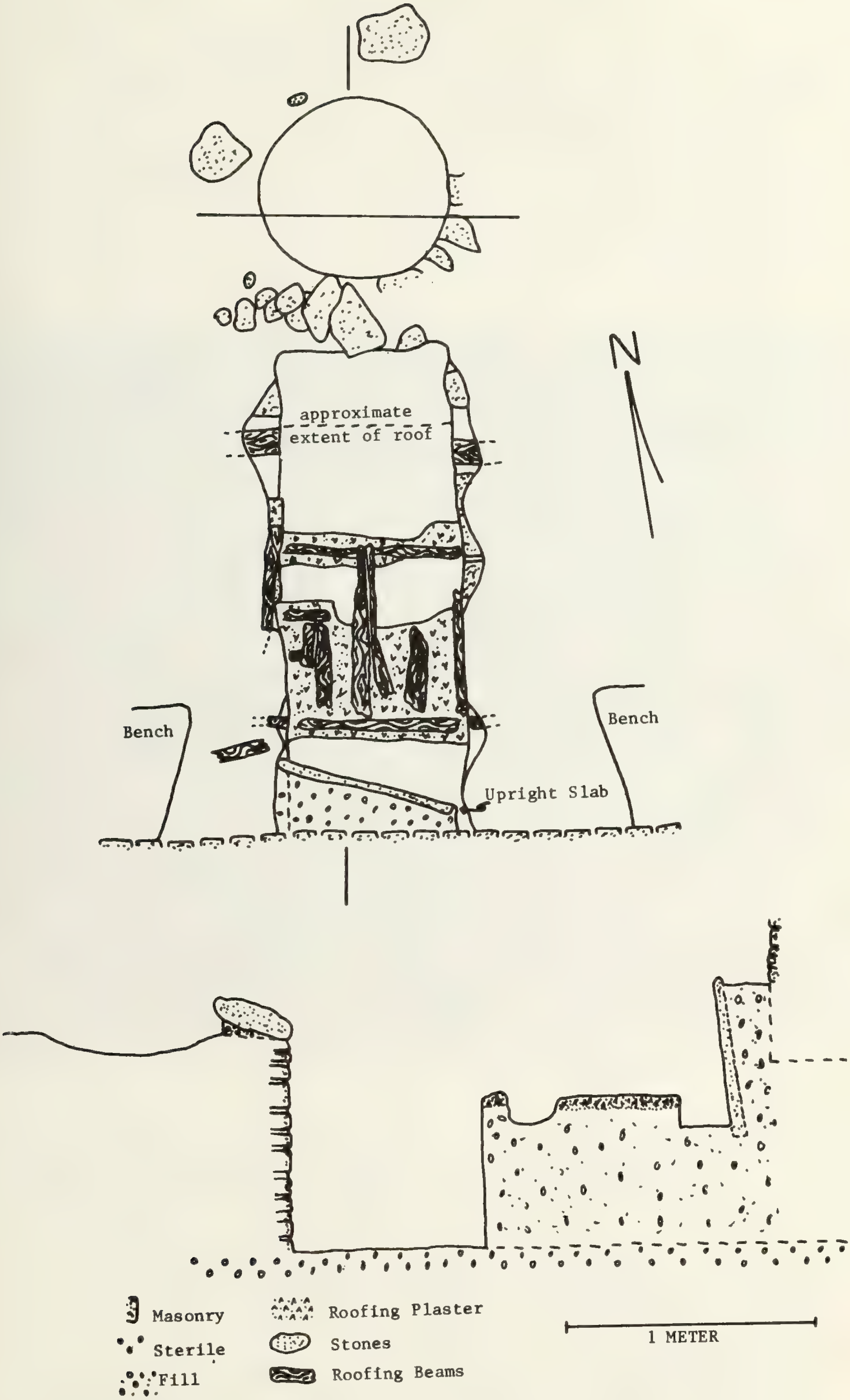


Figure 65: Detailed plan and profile views of the ventilator tunnel in Kiva A.

Figure 66: View of the intrusive wall built on fill above the floor in Kiva A.

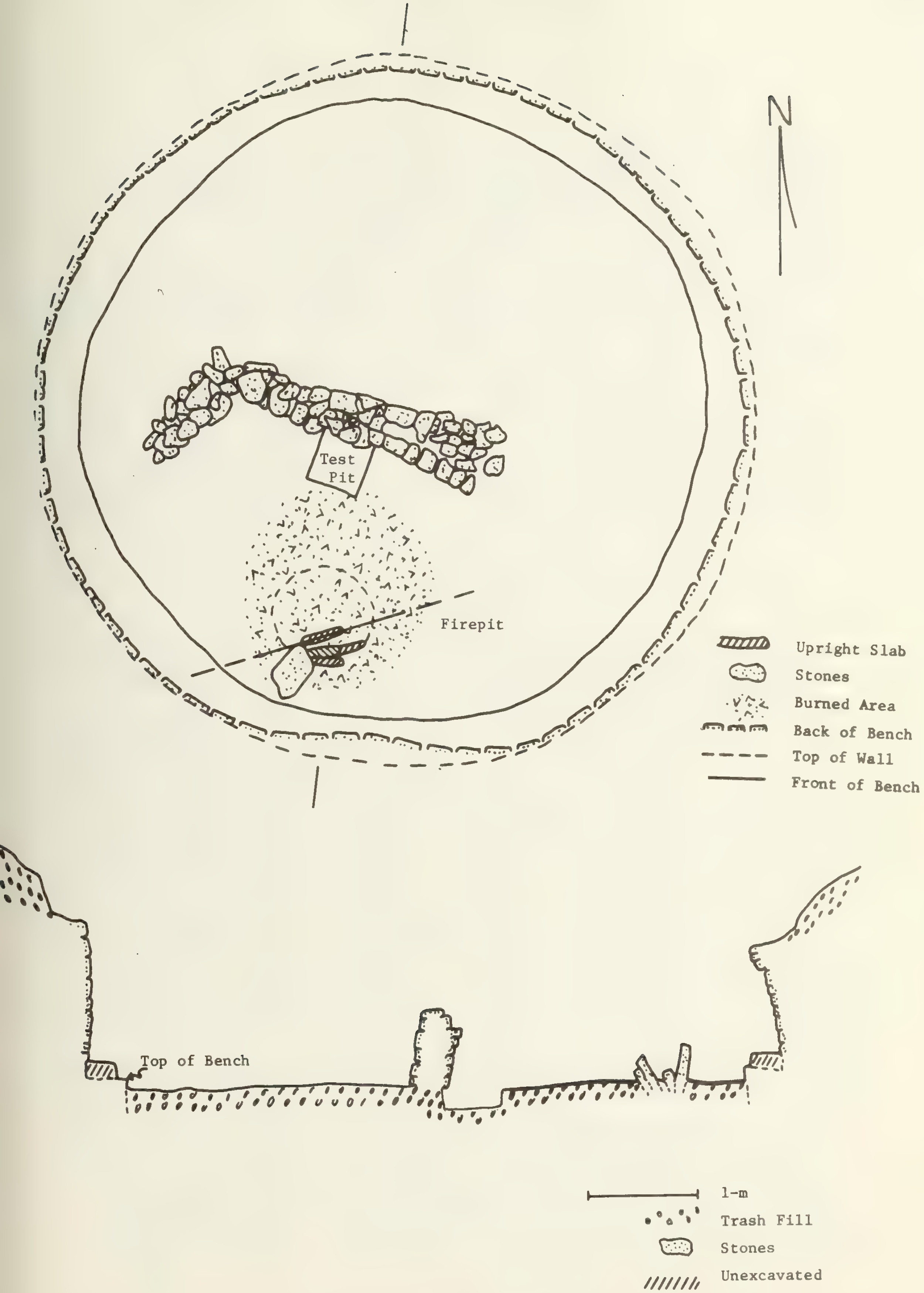


Figure 67: Plan and profile views of the intrusive wall in Kiva A.

Canis sp., jackrabbit, and turkey; and three individuals of cottontail. Most of the bones were fragments, a few display butcher marks and a few had been gnawed by rodents (probably a post-abandonment feature). The clusters of bones do not seem to indicate manufacture areas but may have been placed in these locations following a meal.

A few artifacts were found in contact with the floor of the ventilator tunnel including five corrugated sherds, one red ware sherd, a gray ware pot base, some bone fragments, a shaped slab fragment, and a bifacial mano fragment. These appear to be random objects which had fallen into the tunnel.

Artifact Conclusions

The total artifact inventory from the site represents an assemblage typical for a Pueblo II-Pueblo III habitation. However, these artifacts are from three separate occupations of the pueblo. The artifacts from the original occupation of the pueblo are overwhelmingly represented compared to the other two occupations although the artifacts were not particularly abundant from the original occupation. Artifacts were sparse from the second occupation levels and the third occupation was represented by artifacts from only one floor. The relative numbers of stone, shell and bone, and artifact types for each occupation period is presented in Table 43. These occupation periods include artifacts from floor contact, floor fill, and other fill levels attributable to that occupation. As seen in the table, 77.8 percent of the artifacts are attributable to the original occupation, 10.6 percent to the second, and 4.1 percent to the third. An additional 7.5 percent of the artifacts were not assignable to the occupation periods.

TABLE 43

NUMBERS OF STONE, SHELL AND BONE ARTIFACTS

BY OCCUPATION PERIODS

Tool Type	1st	2nd	3rd	Not Assignable
Projectile points	3	1	-	-
Drills	6	-	-	-
Blanks, preforms, other	5	-	-	-
Bifaces	9	-	-	-
Scrapers	5	1	-	-
Denticulate edged tools	4	-	-	2
Axes	5	3	1	-
Hammers	2	-	-	-
Mauls	1	-	-	1
Choppers	19	1	1	1
Hammerstones	27	5	1	-
Slab metates	10	-	1	2
Trough metates	-	1	-	1
Manos	64	2	7	13
Grinding stones	18	11	1	3
Polishing pebbles	8	4	-	-
Anvils	7	1?	1	3
Abraders	3	1	1	-
Shaped slabs	13	3	1	1
Tablets	12	2	-	2
Other ground stone	3	-	-	-
Pendants	2	-	-	-
Petroglyphs	8?	-	-	-
Shell artifacts	1	-	1	-
Bone awls	15	2	-	-
Bone reamers	6	1?	-	-
Bone weaving tools	16	-	-	-
Bone scrapers	6	1	-	-
Bone tubes	4	-	-	-
Miscellaneous bone artifacts	3	-	-	-
Fragmentary bone tools	19	2	-	-
Totals	301	41	16	29
Percentages	77.8%	10.6%	4.1%	7.5%

Given the overwhelmingly greater number of artifacts in the original occupation levels, it is difficult to compare the inventories from the three occupations. The limited number of artifacts from the second and third occupations prevents meaningful comparisons. Although no significant differences were noted between the occupations in these basic assemblages, the original occupation had some artifacts, not present in the second or third periods, which are similar to objects found in Chaco Canyon. These include the gar scales, the turquoise and jet pendant, the well formed sandstone tablets and abraders (Vivian and Mathews 1964:93-94), and the paint grinder. This would suggest at least some Chaco influence or trade in the original occupation which is probably not present in the second or third occupations.

One similarity noted in the three assemblages presented in Table 43 is the presence of artifact types which are a Mesa Verde regional style. These include the slab metates and manos (troughed metates occur in Chaco Canyon at this time), and the presence of perforated mammal tibias (tibia tinklers?) which do not occur in the Chaco Canyon region. In addition to these artifacts the predominant ceramic assemblage is the Mesa Verde Ceramics. Trade wares occur in all three occupation periods at low frequencies. The ceramics indicate trade in the original occupation with the Kayenta Region, the Cibola Region, and with the Chaco Region. In the second occupation there were trade wares from the Kayenta Region, the Cibola Region, and local interregional trade. The trade ware from the third occupation is from the Kayenta Region; however, its occurrence may represent only a reuse of artifacts present on the site.

The second and third occupation inventories are consistent with styles usually attributed to the Mesa Verde Region. The

original occupation has both Chaco Canyon and Mesa Verde artifacts. These artifacts may be interpreted functionally by a simple breakdown between male and female manufacture and use. A similar cultural dichotomy was noted by Eddy (1977:49-50) at the Chimney Rock Pueblo, a Chaco outlier located east of Escalante (Fig. 1), which he attributes to intrusive male population intermarriage with local women. The predominant ceramic assemblage and the style of milling stones is typical of the Mesa Verde Region. These artifacts are of female use and manufacture. The occurrence of perforated mammal tibias is also a Mesa Verde Region occurrence and may also, by the reasoning presented above, represent female use and manufacture. The primary evidence for a male-Chaco influence is the architectural evidence of the pueblo which was built in the original occupation. The gar scales, the pendant, the abraders and tablets, and the paint grinder are the objects of Chaco Canyon style and by similar reasoning should then represent male use and manufacture. The pendant, abraders and tablets, and paint grinder are either objects of ornamental use and manufacture or used for preparing paints. These activities might have been performed by men. The gar scales, an object procured by either travel or trade could have been used as an ornament or had a ceremonial value also inferring male use and procurement.

The artifact assemblages indicate an original occupation of the pueblo by a Chaco Canyon male population with intermarriage with women of the local Mesa Verde culture. Some trade is evidenced with other areas by the presence of trade wares and the use of obsidian. The second occupation inventory suggests that the reoccupation of the pueblo was by a Mesa Verde population and although the reoccupation was extensive possibly occurring throughout the pueblo, it was of short duration. Some trade is also

indicated in this occupation. The third occupation inventory also indicates a Mesa Verde cultural group, possibly a single family, occupying the habitation for a limited period of time.

CHAPTER IV

DATING

Stratigraphic Profiles

The stratigraphic profiles for the rooms show similar levels of deposition. The original floors are all prepared and plastered on sterile soil in conjunction with the bases of the walls. Following the original building and occupation, Rooms 2, 8, and 9 fell into disuse. Room 2 was abandoned long enough for a thin layer of wind blown sand to accumulate on the floor before the roof fill. The rest of the rooms all had burned roof material in the first level above the floors. It appears that the roofs might have burned simultaneously, perhaps at the abandonment of the pueblo.

Above the roof fall material (in Room 2 above the trash filled level) a thick packed clay level ranging from 45 to 62 cm above the original floors indicates reoccupation at this higher level. The higher floor levels corresponded to remodeled architectural features such as blocked doors, raised sill levels in doorways and blocked cross bars in "T"-shaped doors. New walls had been built at the north and south ends of Room 5 to divide Room 5 and Room 6.

The architecture exhibited in the remodeling is a much cruder masonry than the original, implying that the people of the reoccupation were not the original builders of the site. It is also possible that the later inhabitants desiring rooms with lower ceilings raised the floor levels through the addition of thick clay levels across the entire rooms.

Two walls representing a third occupation level were found in Rooms 2 and 9A. The remains of these walls both stand three courses in height and both walls indicating a possible comtemporaneity of use. This occupation seems to represent a short or perhaps temporary reuse of the pueblo. The location of these walls atop the ruins of former walls suggests that their occupations occurred long after the previous occupations of the pueblo.

Kiva A shows a slightly different sequence of occupation. Following the abandonment there is a trash buildup across the floor, but there is no evidence of the same burn which had occurred in the excavated rooms. Most of the timbers had been removed from the kiva roof and the lowest beams which had been socketed into the walls had collapsed in the fill prior to the reuse of the kiva is similar to the second occupations found in the rooms in that the wall is built on a level of thick clay, presumably added by the reoccupants, and that the reuse occurred prior to the collapse of the walls. It is probable then that the intrusive wall in the kiva is contemporaneous with the second occupation floor levels seen in the rooms. Following the abandonment and at least partial collapse of the structure within the kiva, the kiva walls began to collapse inward and the kiva was filled with the rocks, mortar, and the natural processes of soil building.

The stratigraphy of the Kiva B test trench exhibits some features which are difficult to explain. The location of the kiva in the hillside below the rest of the pueblo proved to be poorly situated for drainage. This was apparent during the excavation of the test trench across the kiva and suggests a difficult drainage problem if it was to be stabilized. It is likely that the builders of the kiva also encountered this problem and it seems possible that the kiva might have not been compelted. There is no evidence

of masonry extending higher than seven courses above the bench on the kiva walls (the north face which is exposed in the trench shows a sterile vertical wall above seven courses of masonry). Also, there were no beams or adobe present in the trench which appear to be roof material. However, the fire pit is present in the floor, and it is filled with ash, evidencing use.

One stratigraphic level ties Kiva B with the rest of the site. This is Level 3, a layer of building stone which is slumped from the pueblo walls above the kiva. This level apparently dates to a time after the abandonment of the second occupation of the pueblo, since the corresponding wall fall in the rooms occurs above the second occupation floors. With the amount of fill in the kiva below this level, it is possible that the structure might have been built either in the first or second occupation of the pueblo. However, the architecture and features of Kiva B appear to be stylistically different from that of Kiva A which had been built in the original occupation. Therefore it seems more likely that Kiva B had been built in the second occupation.

Ceramic Dating

Table 44 shows the time extent of the pottery types. As already discussed, the time span indicated from the dating of the four predominant classifiable ceramic styles, Mancos Black-on-white, McElmo Black-on-white, Mancos Corrugated, and Mesa Verde Corrugated is A.D. 1100-1150.

The trade ware cross-dating indicates a time span from A.D. 1075-1150. The dark and dotted lines shown for Wingate Black-on-red and Puerco Black-on-red indicate their most abundant use as trade wares (black lines). The time span indicated for Tin Cup

Polychrome is the same as the Mancos Black-on-white since the type is considered as a Mancos Black-on-white deviant (Washburn 1976: 18-19).

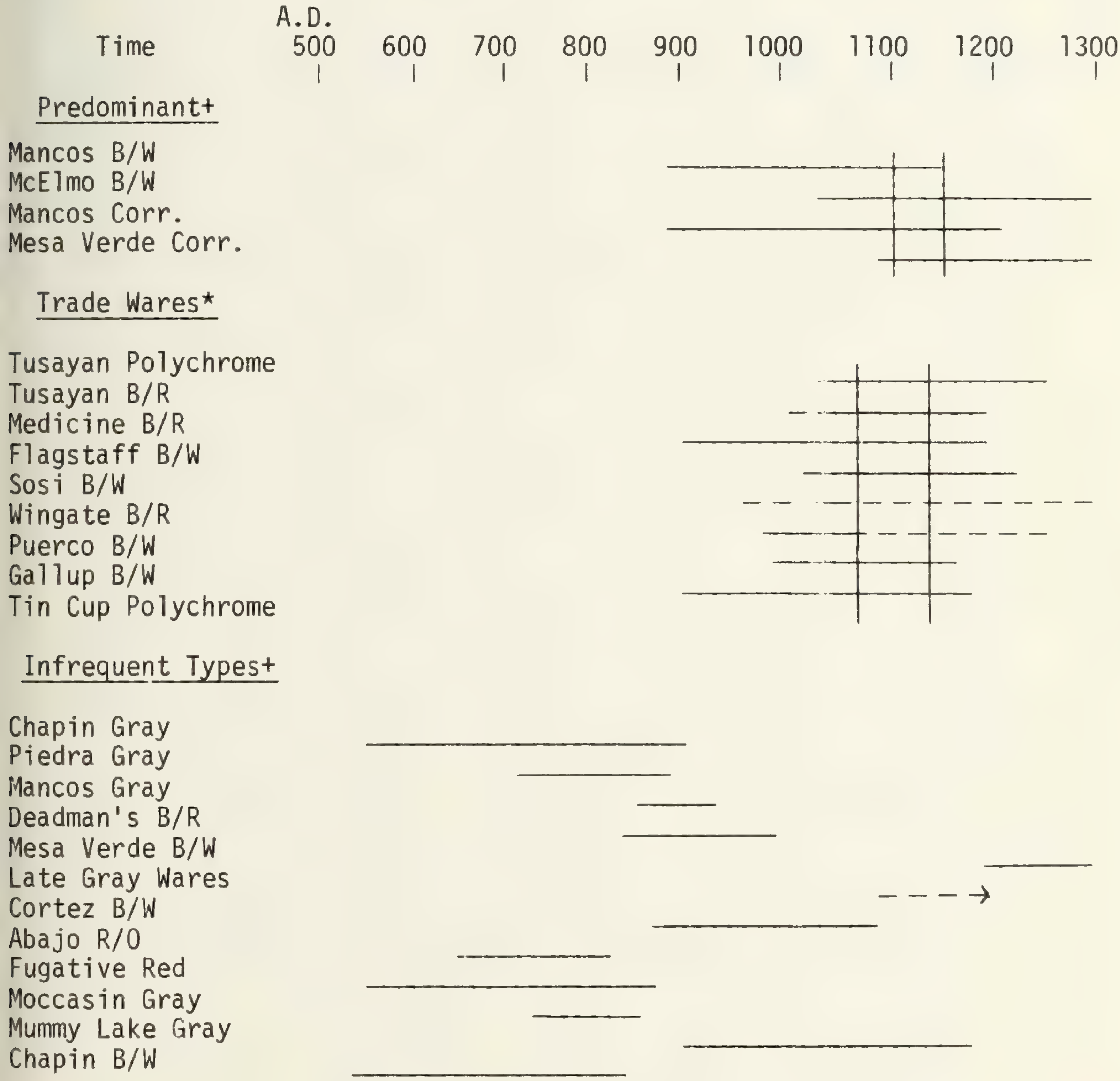
The third group in Table 44 is the assortment of Mesa Verde Ceramic Types given in descending order by the frequency of occurrence. These early to late types equal 5.09 percent of the classifiable sherds or 1.26 percent of the total number of sherds. The time span indicated ranges from A.D. 850-1200. As already discussed, the early ceramics occurred throughout the excavations from floor levels to general surface and probably represent heirloom pieces which continued in use to a much later period than is ordinarily designated as the time range. The late types, including Mummy Lake Gray, Late Gray wares and Mesa Verde Black-on-white had only sporadic occurrence. The Mummy Lake Gray occurred in floor proveniences of the first occupation. The Mesa Verde Black-on-white and Late Gray wares were found in upper fill levels and on the floor of Room 9A, a third occupation floor level.

Room Sequences

A comparison of the frequencies of pottery types associated with the floors was made to determine historical relationships of the floor levels in the rooms. Table 45 shows the numbers of sherds by type for each floor. The lists include the floor artifacts and the floor fill (5 to 10 cm above the floor), and for Kiva A also includes the bench fill and artifacts from the floor features. As is seen in the table, any strict comparison between these levels will be skewed since there are many more first level floors, and the number of artifacts associated with the floors in the first levels is about fourteen times that of the other levels combined. For this reason only general indications of time will be discussed.

TABLE 44

CERAMIC DATING SEQUENCES FOR THE PREDOMINANT CERAMIC WARES, TRADES WARES AND THE INFREQUENT MESA VERDE CERAMIC TYPES.



+ Dates from Breternitz 1966
* Dates from Breternitz,

TABLE 45

NUMBERS OF SHERDS BY TYPE FOR THE FLOORS FROM THE THREE OCCUPATION LEVELS

Types	FIRST									SECOND					THIRD
	Rm 2	Rm 8	Rm 10	Rm 20	Rm 5	Rm 6	Rm 9	Kiva A	TOTAL	Rm 10	Rm 6	Rm 9	KivaB	TOTAL	Rm 9A
Mancos B/W	70	40	10	2	53	14	20	89	298	6	16	3	9	34	36
McElmo B/W		23	37	5	8	10	14	2	99	7	5	1	14	27	33
Mancos Corr.	3	33			10	11	1	10	68		2			2	3
Mesa Verde Corr.		10	1	4	7	4		3	29						
PII-PIII Corr.			3	2					5			1	2	3	
Fugative Red		3							3						
Chapin Gray	3				1				4						
Moccasin Gray	1								1						
Abajo R/O	1				1				2						
Deadmans B/R						2			2		2			2	
Piedra B/W					4	1			5	1				1	
Cortez B/W	1								1						
Mancos Gray										2				2	1
Mummy Lake Gray					1				1						
Late Gray Ware					2				2						1
Mesa Verde B/W															
Uncl. Corr.	126	127	104	99	413	258	33	165	1325	22	37		18	77	33
Uncl. Plain Gray	153	89	26	8	72	25	12	118	503	4	6		4	14	11
Uncl. White Ware	58	34	31	6	17	7	28	20	201	21	7	20	12	60	40
Uncl. Red Ware	1	2	2		1	3	3	1	13						
Tusayan Poly.		1	35		17		1		54	1				1	
Tusayan B/R	1	1	3	2	3				10						1
Medicine B/R			1						1						
Uncl. Tsegi Red Ware			10	3	6				19						2
Flagstaff B/W			5	2					7						
Unid. Wares	3			1					4	1				1	
TOTALS	421	363	268	135	616	335	112	408	2658	65	75	25	59	224	158

One indication of a slightly later date for the second and third levels is seen in the tallies of Mancos Black-on-white and McElmo Black-on-white. For the first level floors the Mancos Black-on-white is usually the more predominant type. The second and third level floors have almost equal numbers of the two types.

Although the frequencies are low, more early sherds are associated with first level floors (eighteen sherds) than with the second and third level floors (six sherds). It is also significant that the early sherds from the second and third levels are of later date (starting with Deadmans Black-on-red, a Pueblo I-Pueblo II type) than the early sherds from the first level floors where there are ten sherds representing four different types not present in the higher levels which are earlier than or partially comtemporaneous with the Deadmans Black-on-red.

The predominant association of trade wares with the first floor levels already discussed in the ceramics section of Chapter III is shown very graphically in this table.

Room 2 has the earliest ceramic assemblage of the first level floors. It has six sherds from four different "early" ceramic types, and it has no sherds of Pueblo III date: neither McElmo Black-on-white nor Mesa Verde Corrugated, which occur in all other proveniences. The architectural evidence also indicates that this room, built after Kiva A, was the first room built of all the other rooms excavated. However, the time span indicated from such an assemblage, before A.D. 1075, seems to be too early for the room's construction when viewed with the tree-ring dates for Kiva A.

Tree-Ring Dates

Tree-ring dates were obtained for 35 wood specimens. The dated specimens came from Room 9, Room 6, Room 20, and Kiva A (Table 46).

Nineteen dates were obtained for Kiva A. Three of the four beams on the Kiva A floor were dated but none of these dates were good cutting dates. Dates were obtained for nine of the beams from the Pilasters. The latest date was from the left beam in Pilaster 2, dated A.D. 1137vv. The dates for the outside rings on the other pilasters vary greatly but all received the same "vv" designation. Since it is probable that all the pilasters were placed in the Kiva A walls at the same phase of construction, this latest date obtained would indicate that the kiva was probably remodeled no earlier than A.D. 1137.

The most confident dates for the kiva are two beams from the Kiva A Fill below the Bench, possibly beams from roof fall, dated as A.D. 1138v and 1136+v. Another beam dates A.D. 1138vv. This group of dates reinforces the pilaster date and indicates a probable remodeling date for the kiva of A.D. 1138.

Room 9 has four dates, one from a beam in the roof fall lying directly on the original floor in the room, Field Number 62. The other three dates are from beams in the roof fall above the floor, two of the specimens being from the same beam, Field Numbers 53 and 57. These two levels represent the same roof fall. One sample from the second level gives a confident date of A.D. 1134r. However, there is a later date from the same level of A.D. 1134+b, which is less confident but indicates a date for the room closer to the date of remodeling for Kiva A.

TABLE 46

TREE-RING DATES FOR KIVA A AND THREE ROOMS

Provenience	Field Number	ESC Number	Species	Dating Inside - Outside
Kiva A				
Floor, beam 4	46	19	JUN	0875fp - 1002vv
Floor, beam 3	45	18	JUN	08950 - 1073+vv
Floor, beam 1	43	16	JUN	0908 - 1088vv
Pilaster 3, left	64	23	JUN	0835+p - 0988vv
Pilaster 4, left	51	21	JUN	0910p - 1027vv
Pilaster 7, right	72	65	JUN	1021fp - 1100vv
Pilaster 7, left	73	66	JUN	1049fp - 1105vv
Pilaster 4, right	52	22	JUN	0919fp - 1110vv
Pilaster 2, right	69	26	JUN	0898p - 1118vv
Pilaster 1, left	79	69	JUN	1022fp - 1127vv
Pilaster 1, right	80	70	JUN	1045fp - 1128+vv
Pilaster 2, left	68	25	JUN	0911p - 1137vv
Fill below bench	17	11	PP	1029p - 1116vv
Fill below bench	13	10	JUN	0986p - 1128vv
Fill below bench	9	8	JUN	1077p - 1136+v
Fill below bench	10	9	JUN	1056p - 1138v
Kiva A fill	5	6	JUN	0935+p - 1057vv
Kiva A fill	4	5	JUN	1042 - 1134vv
Room 9				
Floor fill	53	52	PP	1074p - 1112vv
Floor fill	57	56	PP	1074p - 1124r
Floor fill	54	53	JUN	0900p - 1134+B
Floor 2	62	64	JUN	0938 - 1118++rB
Room 6				
Floor 2 fill	32	44	JUN	0932fp - 1084vv
Floor 2 fill	33	45	JUN	0946fp - 1084vv
Sub-Floor 2	40	48	JUN	1056fp - 1098vv
Room 20				
Level 6	56	123	PP	1064p - 1112vv
Level 6	54	122	JUN	1016fp - 1129r
Level 6	60	127	JUN	1044 - 1129r
Level 6	57	124	JUN	1047p - 1129rB
Level 6	58	125	JUN	0974p - 1129rB
Level 6	59	126	JUN	1020 - 1129rB

TABLE 46 (Continued)

Provenience	Field Number	Field Number	Species	Dating Inside - Outside
Room 20 (continued)				
East wall break fill	64	131	JUN	0984+p - 1129rB
Floor 2	63	130	JUN	1056p - 1128+r
Floor 2	62	129	JUN	1096p - 1129rB

year = no pith ring present
p = pith ring present
fp = far from pith
+p = had to count back to pith
B = bark present
r = ring
v = within a few years
vv = cannot estimate distance to outside ring
+ = one or more rings may be missing
++ = cannot be dated beyond a certain point

JUN = Juniper
PP = Ponderosa Pine

Room 6 has three dated beams. One, Field Number 40, is from the trash fill below Floor 2, the original floor in the room. The other two are from above Floor 2, in the roof fall layer. It would be expected that the beam from the lower level would have an earlier date. The dates obtained for the beams contradict this due probably to the decayed and burned condition of the beams, which all have a "vv" designation. The latest date is for the beam located below Floor 2, dated at A.D. 1098vv, which indicates that the room was built at least no earlier than this.

Seven of the samples from Room 20 have the outermost ring present around the available circumference, and two of these also have bark present. All dated A.D. 1129 and were from burned roof fall on Floor 2, the original floor level in the room, or in Level 6 above Floor 2, also burned roof fall from the same roof. This cluster of dates is the most confident for the pueblo and indicates a building date of A.D. 1129 for the room. All of the outer rings from the beams were complete indicating that they had been cut after July 1129. Room 20 is one of the rooms in the southern addition onto the pueblo. This room would be expected to have a similar date as Room 9 which adjoins it and which by architectural evidence was built as part of the same addition. It would also be expected to have the same or slightly later date from the rest of the room block to the north since it is part of an addition or revision in the building of the pueblo.

The samples from Kiva A give a good date for the remodeling of the kiva, A.D. 1138. The date of A.D. 1129 from Room 20 indicates an earlier date for the building of the rooms. Given the architectural evidence that the room block was built onto the Kiva A quadrangle, the tree ring evidence forces the interpretation that the layout of the pueblo had been a planned arrangement with

the kiva at the center and that the building of the pueblo began in or slightly before A.D. 1129 and the kiva was remodeled about A.D. 1138.

Specimens from a variety of trees were recovered. Of the dated specimens 90 percent were juniper and 10 percent were ponderosa pine. The specimens from Room 10, none of which were dated, were all from short ponderosa. Additional undated specimens from Room 9 were cottonwood. Samples from the third occupation floor of Room 9A were all of short pinyon from which no dates could be obtained.

Dating Conclusions

The stratigraphic evidence indicates that the original inhabitants of the pueblo had occupied the pueblo long enough for several rooms to have fallen into disuse. The roof collapsed in Room 2, which according to the excavations thus far conducted in the pueblo, was the second room built in the pueblo. This room was subsequently used as a trash deposit and the two rooms adjoining it to the south, Rooms 8 and 10, were also used for trash deposits. Burned roof material in all of the rooms but Room 2 (where the roof had previously collapsed) indicates that the pueblo had burned, presumably on the abandonment by the original occupants.

The second occupation was subsequent to this. The pueblo was probably not abandoned for very long between the two occupations since there is little evidence of any natural erosional forces between the roof fall materials and the remodeling activities. The scarcity of the artifactual materials associated with the second occupation and the elusive nature of the second occupation floors (which were not well packed by extensive use) suggests that this occupation was of short duration.

The third occupation followed the second after a period of long abandonment. This occupation appears to have been of very short duration.

The ceramic evidence suggests some general dates for the occupations. In the original occupation Mancos Black-on-white was the most frequent ceramic type and McElmo Black-on-white occurred in the second greatest frequency. This suggests a date when the two ceramic types overlap in time, but before the McElmo Black-on-white becomes predominant: post A.D. 1075, at the early extreme of this time span. Other rooms have assemblages which suggest ages more at the middle to later range of the time span.

In the second occupation Mancos Black-on-white and McElmo Black-on-white occur in almost equal frequency suggesting a date of about A.D. 1150.

In the third occupation Mancos Black-on-white and McElmo Black-on-white also occur in almost equal frequency; however, a sherd of Mesa Verde Black-on-white on the floor of Room 9A suggests a much later date for this occupation of about, or post A.D. 1200.

Tree-ring dates were obtained only for the original occupation. Room 20 had a very confident date of A.D. 1129 for the building of that room. Room 9 had a less confident date of A.D. 1124. These rooms are part of the southern addition onto the pueblo and although they are part of the original occupation, they may or may not have been built at the same time as the rest of the rooms. A less confident date of A.D. 1138 was obtained for the remodeling of Kiva A. This date is obtained for the pilasters which are the base of the kiva roof. By this evidence it appears that Kiva A was rebuilt long after the pueblo had been laid out and the rooms were built.

The compiled dating evidence suggests a firm building date of A.D. 1129 for one room, with the earliest room possibly built as early as A.D. 1075. Kiva A, enclosed in the original pueblo, was reroofed in A.D. 1138. The tree-ring dates indicate an occupation span of at least nine years for the pueblo. The ceramic assemblage which suggests a date of A.D. 1075 for Room 2 seems excessively early as this would indicate an occupation of 63 years for the original occupation. This length of occupation is not warranted by the excavation evidence. However, the assemblage of the room does suggest that the original occupation of the pueblo in the earlier part of the pueblo may be earlier than the confident building date (A.D. 1129) from Room 20 has provided.

An age of about A.D. 1150, provided by the ceramic assemblage for the second occupation, seems to correspond well with the stratigraphic evidence for a reoccupation of the pueblo which follows a short abandonment.

A date of A.D. 1200 or later is suggested by the ceramic assemblage for the third occupation which is also reinforced by the stratigraphic evidence.

CHAPTER V

CONCLUSIONS

The excavations at the Escalante Site were of approximately one-third of the pueblo. This entailed the excavation of seven rooms and of the kiva within the room block. It also included the trenches placed along the exterior walls for stabilization purposes and the trench in the second kiva lying at the southern edge of the pueblo.

The excavations revealed three prehistoric occupations of the site. The entire room block with the enclosed kiva had been built in the original occupation. The architecture displays Chaco influence in its planned layout, the masonry style, the size and height of the rooms and the style and emplacement of the kiva within the room block.

The reuse of the pueblo in the second occupation was evidenced in all of the excavated rooms. The evidence of similar occupation levels seen in many of the stabilization trenches in the rooms along the exterior walls of the pueblo indicates that the reuse of the pueblo in the second occupation may extend throughout most of the pueblo. New construction in the pueblo included the addition of walls to divide rooms (north walls of Rooms 5 and 6), remodeling of doors (doors between Rooms 2 and 8, Rooms 8 and 10, Rooms 10 and 20, and Room 9 and the exterior of the pueblo), the addition of a room in Kiva A (intrusive wall built on fill), and the addition of Kiva B lying at the south edge of the room block. The masonry of the new construction includes the use of drywall masonry, of a less masterful or "sloppy" appearance of the remodeling, and a different style of kiva layout and construction.

These aspects of masonry are identifiable as being more typical of the Mesa Verde style of architecture.

The third occupation was present in only two rooms. The evidence suggests that this occupation was a short term reuse of the pueblo by a small group of people. The architectural evidence for the occupation is limited. Only two walls are identifiable as being constructed in this occupation. One was a simple wall in very poor condition. The other had three courses still standing in bad condition of a compound wall with no rubble fill. The masonry of the walls shows no indication of Chaco influence but are not inconsistent with a Mesa Verde style of architecture.

The artifactual evidence adds more information for an assessment of the occupations. In the first occupation the assemblage includes artifact types which are attributable to Chaco Canyon and types which are attributable to Mesa Verde. These types, as discussed in the Chapter III artifact conclusions appear to represent a male and female dichotomy of use. The milling stones and ceramics are of types attributable to the Mesa Verde area and are objects of female manufacture and use. The architecture of the original occupation is of a Chaco Canyon style and architecture is generally attributable in prehistoric societies to a male manufacture. Artifacts of ornamental and possible ceremonial use are of styles comparable to objects which may be of male manufacture and use. The artifact evidence with the architectural evidence suggests a male Chaco population. It is suggested that the original occupation was of a male population from Chaco Canyon with intermarriage with females of the local Mesa Verde population.

Other types of artifacts are not attributable to one or the other cultural groups. Many of these artifacts are similar for the two cultural groups such as chopping and pounding tools, flake

debitage and projectile points. Although at some time intensive artifact research may be able to distinguish these groups, no valid distinctions can be identified at this time.

For the second and third occupations the artifacts identifiable to a female Mesa Verde culture are similar to those from the original occupation but no artifacts identifiable to the Chaco Canyon culture are present. Since the architecture also appears to be of the Mesa Verde style, it is suggested that the reoccupations of the pueblo were by populations of the Mesa Verde culture.

The original construction and occupation of the Escalante site was by a colony from Chaco Canyon. A number of sites in as dispersed locations outside of Chaco Canyon as Chuska, Zuni, Chimney Rock and Tesuque have been identified as being Chaco Canyon colonies (Ford, Schroeder, and Peckham 1972:35), which are often referred to as Chaco outliers.

The excavations at the Escalante Site raise many questions as to the function of this Chaco outlier site. The location of the site at a commanding view and along a route known historically to be an old trade route would suggest its use as a trading outpost. However, few trade wares and objects of trade are present in the assemblage.

Eddy (1972:p. VI 70 and 71) had suggested the presence of a male group from Chaco Canyon occupying a commanding position almost at the pinnacle of Chimney Rock as a colonizing group of religious elite in the Chimney Rock community. Martin also suggests the Lowry Ruin as a religious center by the presence of the great kiva which had continued in use throughout the occupation of the site (1936:207). No similar use is indicated for the Escalante site. Although the site has a commanding view, it is not located

at what might be a spectacular and perhaps spiritual location nor did it have a great kiva associated with it.

Another theory raised is that this site may not be a colony but represents a site of the McElmo phase. Three different phases of Anasazi development and tradition have been suggested for the Chaco population in Pueblo III times. These include what Vivian and Mathews described as the Bonito Phase, Hosta Butte Phase, and the McElmo Phase (1964:108-110). The Escalante site seems to fit most closely in the McElmo Phase as exemplified by Kin Kletso and described by Vivian and Mathews (Ibid.) based on eight criteria. These criteria include a compact, multistoried plan; kivas enclosed in house blocks; one period site with no development in place; walls faced on both sides with a thin core; typical facing of large blocks of soft stone, pecked and dimpled; Pueblo Bonito or San Juan style kivas; great kivas absent; low artifact inventory with low diversity; and close proximity to water collecting systems. Vivian and Mathews have suggested that this phase, dated A.D. 1050 to 1124+ is a site intrusion into the Chaco area, introducing dimpling in the masonry and the McElmo pottery. However, the two sites, Escalante and Kin Kletso, display some differences which would not be expected if the two sites were of a single phase. These differences in the artifact inventory are the milling stones and the ceramics. At Kin Kletso, the milling stones are troughed metates and the predominant type in the ceramic assemblage is McElmo Black-on-white evidently of a local type, not identifiable as being a trade ware of the Mesa Verde Ceramic series. At Escalante the inventory includes slab metates and the ceramics are of the regional Mesa Verde Ceramic with Mancos Black-on-white the predominant type. Although these artifacts represent objects of female manufacture and use and may represent a single male fraction intermarrying with local populations, it still

remains to determine whether the male populations of the McElmo phase site represent the Mesa Verde Region as Vivian maintains or the Chaco Region as supporters of a Chaco colony concept would maintain. It is possible that the numerous migrations of Chaco peoples as evidenced by other Chaco outliers such as Salmon or Aztec could have developed this new phase and that Kin Kletso and Escalante, both dating late in the period of Chaco outliers, are a result of colonization from the other established Chaco colonies to new locations or back into Chaco.

It is proposed, however, that the construction and subsequent occupation of the Escalante Site was by a colony of men from Chaco Canyon who represent part of the abandonment of the Chaco Canyon. The latest dates from Chaco Canyon marking the abandonment are about A.D. 1130 and by A.D. 1150 all had departed (Vivian and Mathews 1964:111). The Escalante colony of Chaco men were then absorbed into the Mesa Verde culture through the intermarriage with women of the local Mesa Verde.

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APPENDIX A

NUMBERS OF ANIMAL BONES AND MINIMUM NUMBER OF INDIVIDUALS FOR THE ROOMS AND KIVAS

	Artiodactyla sp.	Deer	Antelope	Mt. Sheep	Bison	Canis	Jack Rabbit	Cottontail	Porcupine	Woodrat	Rock Squirrel	Pocket Gopher	Deer Mouse	Prairie Dog	Marmot	Beaver	Turkey	Unid. Bird	Hawk	Raven	Mourning Dove	Human	Unid. Bone Frag.	Fish
Room 2																								
Fill (6)	(17)	1(9)				1(2)	1(2)	4(28)		1(1)							1(1)					1(10)	31	
Floor (7)	(29)	1(9)	1(2)	1(1)		1(2)	1(1)	3(11)	1(1)	1(20)	1(31)						1(1)						36	
Floor fill (10)	(2)	1(2)		1(1)			1(1)	8(91)			1(5)												16	
Total																								
Room 5																								
Fill (8)	(10)	1(3)	1(2)			1(1)		2(10)			1(2)						1(1)						41	
Floor (9)	(1)									1(1)	1(2)												2	
Floor fill (11)	(33)							1(6)			1(1)	1(1)					1(3)					1(1)	44	1(52)
Floor fill S 1/2 (13)	(8)	1(4)	1(3)				1(1)	3(28)		1(7)	1(14)			1(1)			1(3)					1(1)	47	
Sub floor 1 S 1/2 (14)	(11)		1(1)				1(1)	2(16)			1(48)						1(2)						4	
Floor 2 contact S 1/2 (15)	(1)																1(1)						1	
Total	(64)	1(7)	1(6)			1(1)	1(2)	4(50)		1(8)	2(65)	1(1)		1(1)			1(10)					1(2)	138	
Room 6																								
Fill (18)	(3)							1(2)															3	
Floor fill (20)	(10)	1(3)	1(1)				1(1)	2(13)						1(1)			1(3)						13	
Floor 1 (22)	(5)	1(4)				1(4)		1(1)															26	
Fea. 1, Floor 1 (23)								1(5)																
Sub floor 1 fill (24)	(21)	1(1)				1(1)	1(4)	2(17)									1(6)						12	
Floor 2 fill (30)	(25)	1(3)	1(3)	1(1)		1(2)	1(1)	1(3)	1(1)	1(1)	1(1)			1(17)			1(3)						59	
Floor 2 (31)	(12)	1(1)		1(1)			1(1)																3	
Sub floor 2 (35)	(8)	1(2)	1(1)	1(1)																				
Total	(84)	2(14)	1(5)	1(2)		1(7)	1(7)	3(41)	1(1)	1(1)	1(1)			1(1)			1(12)						104	
Room 8																								
Fill (19)	(3)	1(1)				1(1)		1(2)																
Fill level 2 (27)	(10)	1(6)	1(3)	1(2)			1(2)	2(24)							1(1)		2(10)							(36)
Floor fill (33)	(24)	2(15)	1(5)			1(3)	1(1)	3(20)		1(1)		1(1)		2(2)			2(15)					1(1)		(57)
Floor (34)			1(1)					1(1)									1(7)							
Total	(37)	2(22)	1(9)	1(2)		1(4)	1(3)	4(47)		1(1)		1(1)		2(2)	1(1)		2(32)					1(1)		(139)

	Artiodactyla sp.	Deer	Antelope	Mt. Sheep	Bison	Canis	Jack Rabbit	Cottontail	Porcupine	Woodrat	Rock Squirrel	Pocket Gopher	Deer Mouse	Prairie Dog	Marmot	Beaver	Turkey	Unid. Bird	Hawk	Raven	Mourning Dove	Human	Unid. Bone Frag.	Fish
Room 9																								
Fill (37)	(1)	1(1)													1(1)								(1)	
Fill level 2 (39)	(1)	1(1)						1(2)									1(1)							
Floor fill (40)	(4)					1(1)	1(3)	1(2)									1(1)						(8)	
Floor (41)	(4)	1(1)						1(1)																
Subfloor fill (42)	(1)																1(5)						(1)	
Total	(11)					1(1)	1(3)	1(5)							1(1)		1(7)						(10)	
Room 9, W ½																								
Floor (224)																	1(1)							
Floor 3 fill (229)	(12)	1(1)					1(1)	1(3)									1(1)						(2)	
Floor 3 (227)	(5)						1(1)										1(1)						(7)	
Subfl 3 (236, 243)	(34)	1(18)															1(14)						(25)	
Total	(44)	1(19)					1(2)	1(3)									1(17)						(34)	
Room 9A																								
Surface (78)			1(1)																					
Floor fill (120)	(1)						1(1)	1(1)																
Floor 1 (128)		1(1)																						
Total	(1)	1(1)	1(1)				1(1)	1(1)																
Room 10																								
Lvl. 3 (53, 56, 57)	(1)								1(1)														(2)	
Lvl. (67)	(4)	1(1)	1(1)							1(1)		1(1)												
Fl. fill (107, 88)	(7)	1(2)						2(6)									1(1)						(1)	
Fl. 1 (170, 109)	(2)	1(1)						1(1)															(1)	
Level 5 (146)	(1)	1(1)																						
Lvl 6 (155, 178)	(3)							1(5)						1(1)										
Lvl 7 (156, 185)	(48)	2(3)	2(3)				1(1)	5(46)		1(1)		1(1)					1(1)						(11)	
Floor 2 (160)	(4)	1(1)						3(15)									1(3)	1(1)					(2)	
Fl 2 fill (189)	(15)	1(1)					1(3)	6(51)									1(13)	2(3)	1(3)	1(3)			(26)	
Lvl 8 (201, 216)	(7)	1(2)					3(6)	3(14)									1(3)						(23)	
Lvl 9 (205)	(3)						1(1)	3(20)									1(2)				1(1)		(5)	
Total	(93)	2(12)	2(4)				3(11)	15(158)	1(1)	2(2)		1(2)		1(1)			2(23)	2(4)	1(3)	1(3)	1(1)		(71)	
Room 20																								
Lvl 2 (130, 251, 247)		1(3)	1(1)				1(1)										1(1)						(2)	
Level 3 (254)												1(1)					1(2)							
Level 4 (244)		1(1)																						
Level 5 (263)																	1(1)							
Level 6 (274)								1(1)															(2)	
North door (276)							1(2)	2(12)															(14)	
Fl 2 fill (293)	(7)						1(1)	1(1)				1(1)					1(3)						(9)	1(1)
Floor 2 (292, 302, 308, 320)	(9)	1(1)	1(2)				1(3)										1(5)						(7)	
Total	(16)	1(5)	1(3)				1(7)	3(14)									1(12)						(34)	1(1)

	Artiodactyla sp.	Deer	Antelope	Mt. Sheep	Bison	Canis	Jack Rabbit	Cottontail	Porcupine	Woodrat	Rock Squirrel	Pocket Gopher	Deer Mouse	Prairie Dog	Marmot	Beaver	Turkey	Unid. Bird	Hawk	Raven	Mourning Dove	Human	Unid. Bone Frag	Fish
Kiva A																								
Fill (3)	(13)	4(10)	1(6)	1(1)		1(5)	1(1)	4(19)			1(1)					1(9)						(81)		
Below Bench (12)	(69)	3(65)	6(42)			1(2)	1(5)	9(68)		1(1)						3(19)					2(7)	(126)		
Bench Fill (16)	(10)		1(2)			1(1)		5(42)	2(3)							1(8)					1(1)	(6)		
Floor fill (17)	(40)	2(72)	2(9)	1(1)		1(1)	1(13)	12(130)		2(6)	1(1)					1(9)					1(1)	(52)		
Bench (4)	(8)	1(4)	1(3)			1(1)	1(1)	3(17)	1(1)							1(3)					1(3)	(3)		
Floor (5)	(1)	1(21)	1(6)																					
Firepit (32)	(9)							1(4)																
N wall repair (38)								1(3)								1(1)						(1)		
Pilaster 5 (45)	(1)									1(2)														
Pil 1 & 6 (43.46)	(1)											1(1)												
Total	(152)	4(110)	6(60)	1(4)		1(10)	2(20)	18(289)	1(4)	2(9)	2(2)	1(1)				3(39)					2(12)	(268)		
Floor vault (26)	(2)	1(2)					1(3)	5(23)			1(1)						1(1)	(2)						
Vent. Tunnel(25)	(98)	2(36)	3(31)	1(5)	1(1)	1(5)	3(29)	22(449)		2(5)	3(10)	1(1)	1(2)			1(1)	3(37	(2)					(121)	
Vent. floor (36)	(3)							1(1)									1(1)							
Vent & Vault Totl	(103)	2(38)	3(31)	1(5)	1(1)	1(5)	3(32)	25(473)		2(5)	3(11)	1(1)	1(2)			1(1)	3(39)	(4)					(127)	
Kiva B																								
Lvl. 1 (93, 161)	(1)	1(1)	1(3)																					
Lvl. 3 (96, 103)	(2)							1(1)																
25 cm above (324)	(3)	1(1)																						
Fl. fill (313,327)	(1)							1(3)																
Total	(6)	1(2)	1(3)					1(4)																
Stabilization Trenches																								
Exteriors*	(15)	1(2)	1(5)				1(1)	1(4)									1(1)	(1)		1(1)		1(3)		
Room 11 (68, 108)	(3)							1(1)																
Room 12 (58)	(1)	1(1)																						
Kiva A Butt. (124)			1(2)																					
Room 18 (152)			1(1)																					
Room 15 (159)		1(1)																						
Room 1 (267)	(2)																							
Room 21 (265)							1(1)	1(1)																
Room 22 (280)		1(1)																						
Room 16 (271)																						1(1)		
Room 20 (254)																						1(1)		
Room 19 (50, 321)			1(1)											4(4)	4(4)		1(1)					1(1)		
Total	(19)	(5)	(9)				(2)	(6)						(4)	(4)		(2)	(1)		(1)		(4)		
General Surface (1)	(2)																							
Overburden (2)	(3)			1(1)				2(8)	1(7)			1(1)					1(2)					(4)		
TOTAL FOR SITE	(681)	11 (258)	7 (133)	2 (16)	1 (1)	1 (32)	7 (92)	75 (1228)	3 (14)	4 (47)	7 (115)	5 (9)	2 (19)	3 (9)	1 (6)	1 (1)	9 (206)	2 (5)	1 (3)	1 (4)	1 (1)	3 (31)	(1013)	(53)

APPENDIX B

BIRD REMAINS FROM THE ESCALANTE RUIN

by S. D. Emslie

The following is a report in the bird remains recovered during the excavations of the Escalante Ruin, southwestern Colorado, during the summer of 1976. Turkey remains (*Meleagris gallopavo*) are not included in this analysis.

Identification of the remains entailed the use of the comparative bird collection of Dr. Lyndon L. Hargrave. I am grateful to Dr. Hargrave for his guidance during my early attempts at bird bone identification. I would also like to thank Mr. Amadeo Rea of the University of Arizona Ornithology Lab for verifying my identifications. However, the results of this report are solely my responsibility.

FS 189 Room 10, Floor 2 Fill

Order: Falconiformes

Family: Accipitridae

Species: Red-tailed Hawk (*Buteo jamaicensis*)

The proximal end of a left femur was identified to this species. The Swainson's Hawk (*B. swainsoni*) overlaps in size with *B. jamaicensis* and several specimens of each species were carefully checked for distinguishing characters before final identification was made.

The Red-tailed Hawk is a resident of Colorado and may be sighted at any time of the year. It is found on the plains and into the foothills or in places where prairie dogs are available for food (Bailey and Niedrach 1965). This species is commonly sighted in southwestern Colorado.

Species: Swainson's Hawk (_B. swainsoni_)

A carpometacarpus with the proximal end and third metacarpal fragmented was identified to this species. Although this element was found in the same provenience as the Red-tailed Hawk described above, it exhibited traits more like the Swainson's Hawk.

The Swainson's Hawk is a summer resident and the most abundant hawk in the state of Colorado (Ibid.). This hawk migrates into the state about mid-March and leaves by the end of September although some have been spotted during the winter months. Accordingly, procurement of this hawk and of the Red-tailed Hawk could have taken place at any time of the year.

Species: Hawk (_Buteo_ sp.)

A left scapula with the distal end fragmented could not be identified beyond the genus-group level. Presumably this scapula is from one of the hawks mentioned above.

Order: Passeriformes

Family: Corvidae

Species: Common Raven (_Corvus corax_)

A complete right tarsometatarsus (length 62.1 mm), a left ulna (length 106.1 mm) and the distal third of a left tibiotarsus were identified to this species. The ulna is from a large female-sized specimen.

The Common Raven is a well known year-round resident of Colorado.

Species: Unidentifiable

In addition to the above elements from this provenience in the site, three were unidentifiable at this time. One is a shaft fragment of a femur of a medium-sized bird, one is a pygostyle of a medium to small-sized bird and the last is a tibiotarsus of a

very young small bird (less than four weeks old). The pygostyle is the tail bone of a bird and also supports the rectrices or tail feathers. It is possible this element was cut from the bird in obtaining the rectrices and was left attached to these feathers.

FS 205 Room 10, Floor 2 Fill

Order: Columbiformes

Family: Columbidae

Species: Mourning Dove (*Zenaida macroura*)

One left femur, fragmented in two pieces, was identified to this species. This species is also a common year-round resident of Colorado and found throughout the state. The specimen represented at the site could have been obtained at any time of the year.

FS 160 Room 10, Floor 2--FA 7

Order: Passeriformes

Family: Corvidae

Species: Common Raven (*C. Corax*)

The shaft section of a left ulna was identified to this species and represents a floor artifact of Room 10. The bone is burned to a dark brown and appears polished. This element could be from the same individual discussed above.

FS 251 Room 20, Level 2

Order: Unidentifiable

One unidentifiable shaft fragment of an ulna was located at this provenience. The element is from an immature medium-sized bird and has been badly gnawed by rodents.

FS 282 Room 20, South Exterior

Order: Passeriformes

Family: Corvidae

Species: Common Raven (*C. Corax*)

A Shaft fragment of the proximal end of a right humerus was identified to this species. The element is from a female-sized individual.

Summary

The species of birds recovered from the Escalante Ruin indicate the environment prehistorically was no different than that of today. All the birds identified can still be found in the region surrounding the site today.

In addition the species identified reflect no seasonality of bird procurement by the prehistoric population. It seems likely, however, that the Swainson's Hawk (*B. swainsoni*), represented by one element at the site, was obtained during the late spring and summer months.

Finally, the presence of a pygostyle (FS 189) indicates probable use of feathers by the prehistoric population.

References

Bailey, A.M. and R. J. Niedrach
1965 *Birds of Colorado*. Denver Museum of Natural History, Denver.

APPENDIX C

PLANT REMAINS FROM THE ESCALANTE RUIN

BY

PETER J. GLEICHMAN

Excavations at 5MT2149 during 1975-76 revealed a general dearth of artifacts and a particular scarity of perishable remains.

Macrobotanical remains were limited to one fragment of corn (Zea mays) and construction beams and posts of poplar (Populius sp.), ponderosa (Pinus edulis), and juniper (Juniperus osteosperma).

In the hope of obtaining microbotanical remains soil samples were taken from firepits, cists, and floor features in rooms 9, 9A, 10, 20 and Kivas A and B. A somewhat haphazard sampling scheme left rooms 2, 4, 5, 6, and 8 unsampled. The soil samples were returned to the Anthropology Laboratories, University of Colorado, and put through an indoor water separation process. Halite (NaCl) was added to water to provide a dense flotation medium. The soil was then added to the flotation medium and the "light fraction" of suspended organic material was removed. The residue or "heavy fraction" was wet-screened and examined for bone, shell, stone, and ceramics. Material recovered was allowed to air-dry, then dry-screened and microscopically sorted, producing carbonized seed remains representing several varieties of wild plants.

Seeds from the Chenopodium and Amaranth families were the most common, being present in small quantities in most of the samples. Due to the poor condition of these seeds and the close resemblance of seed boat morphology between the two families, the

seeds have not been identified as to family and the various genera recovered have been lumped under the heading cheno-ams. Ground cherry seeds were recovered, as were seeds from the sunflower, mallow, loasa, and grass families. A chokecherry pit and a carbonized juniper berry and twigs were also recovered. Most of the plants represented are "weedy" types or pioneers in disturbed areas, and all have documented ethnographic use in the Southwest, with the possible exception of sedge.

Room 9

The sample from the ashpit in Room 9 contained no seeds, but did contain a half-dozen microliths or small waste flakes, and 2 unidentifiable bone fragments.

The sample from Floor 3 (dating to the original occupation of the ruin) contained a rib from a turkey (*Meleagris gallopaud*) and the following seeds: cheno/ams, grass, composit, ground cherry, and a juniper berry, as well as one unidentified seed.

Room 9A

Room 9A is postulated as representing a third occupation of the site. A sample taken from the floor contained *Mentzelia* seeds, while a sub-floor sample had grass seeds. The fill of Feature 2 (a slab-lined firepit) contained cheno/ams, microliths, and unidentifiable fragments of burned bone. A sample from Feature 1 (firepit) also had one microlith, but lacked seeds.

Room 10

A sample from Quad B, Level 4, a trash level directly above Floor 1 (dating to the second occupation) produced cheno/ams. The firepit associated with Floor 1 also produced cheno/ams, one microlith, and one bone fragment. The sample from Floor 2 (the original occupation), Feature 1, one contained cheno/ams, while

the sample from the east pit in Floor 2 contained mallow seeds and cheno/ams.

Room 20

Several samples were taken from floor features in Room 20, Floor 2 (associated with the original occupation) all contained cheno/ams. The sample from Feature 5 had grass seeds, sedge seeds, carbonized juniper twigs, and a fragment of egg shell, assumed to be turkey egg. Features 6 and 7 both had mallow seeds and juniper twigs. Feature 6 also contained grass seeds and a chokecherry pit. Feature 7 contained ground-cherry seeds. Room 20 also produced the only corn from the site - the charred tip of an 8-rowed cob.

Kiva A

The firepit in Kiva A consisted mostly of white ash and did not contain seeds. It did have the burned astragalas of a cottontail (*Sylvilagus audobonii*).

Kiva B

The fill above the floor of Kiva B contained cheno/ams, grass, and *mentzelia* seeds.

Quantities of seeds recovered were all small, generally only a few individuals per soil sample. It is likely that they are seeds lost during the process of food preparation. The above mentioned lack of samples from other rooms makes corroboration of Nemetz' postulated room functions tenuous. It appears that firepits served as a recepticle for floor sweepings, as they generally contained bone fragments and lithic waste from tool manufacture and/or use.

PLANT USES AND AVAILABILITY

Pinaceae - Pine family

Juniperus osteosperma (Torr.) Little

"Utah Juniper"

large shrub or small tree

3000-7500'

common throughout the southwest, a codominant in the pinyon-juniper forest

The fruits (berries) are avaialable from approximately mid-September through mid-November and have been harvested as a food source by various southwestern groups.

Amaranthaceae - Amaranth family

"Pigweed"

Chenopodiaceae - Goosefoot family

"Goosefoot" "Lambsquarters"

herbacious annuals and perennials

adventures in disturbed ground

Numberous species of both pigweed and goosefoot are present in the southwest. Available as greens throughout the summer, seeds available in late summer and fall.

Compositae - Sunflower family

Unidentified as to general level - there are some 13,000 species of composits, many being adapted to disturbed habitats.

Cyperaceae - Sedge family

Carex sp.

"Sedge"

Common plant in riparian areas, numerous varieties.

Gramineae - Grass family

Genus unidentified - Seeds of various grasses are available from early June until late September.

Loasaceae

Mentzelia sp.

"Stickleaf"

Herbaceous perrenial, blooms in mid-summer, seeds available in late summer. Seeds of this plant were collected for both construction and medicinal purposes by southwestern groups.

Malvaceae - Mallow family

Genus unidentified. Many plants in this family are pioneers in disturbed ground and burned areas. The roots of sphaeralcea sp. were utilized by southwestern groups for medicinal purposes.

Rosaceae - Rose family

Prunus virginiana L.

"Chokeberry"

Large shrub or tree up to 25 feet in height

4500-8000 '

Fruit available from August until late October, eaten fresh or dried.

Solanaceae - Potato family

Physalis sp.

"Ground cherry"

plant of disturbed soils

fruit available in late summer and fall

TABLE 1

LOCATIONS OF WILD PLANT REMAINS

Provenience	Juniper	Cheno-Ams	Composit	Grass	Mentzella	Mallow	Prunus	Physalis	Sedge
Room 9, W 1/2 Floor 3	x	x	x	x				x	
Room 9a, Floor 1					x				
Room 9a, Sub-floor 1				x					
Room 9a, Floor 1, Feature 2		x							
Room 10, Quad B, Level 4		x		x					
Room 10, Floor 1, Firepit		x							
Room 10, Floor 2, Feature 2		x							
Room 10, Floor 2, East pit		x				x			
Room 10, Floor 3		x							
Room 20, Floor 2, Feature 2		x							
Room 20, Floor 2, Feature 5	x	x		x					x
Room 20, Floor 2, Feature 6	x	x		x		x	x		

TABLE 1 (Continued)

LOCATIONS OF WILD PLANT REMAINS

Provenience	Juniper	Cheno-Ams	Composit	Grass	Mentzella	Mallow	Prunus	Physalis	Sedge
Room 20, Floor 2, Feature 7	x	x				x		x	
Kiva B, Fill above floor		x		x	x				

STABILIZATION OF ESCALANTE RUIN 5MT2149

AND

DOMINGUEZ RUIN 5MT2148

DOLORES, COLORADO

by

Adrian S. White

and

David A. Breternitz

PART III

Cultural Resource Series No. 7

Colorado State Office

Bureau of Land Management

1979

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The excavation-stabilization of Escalante Ruin was conceived by the Bureau of Land Management personnel, and in particular I wish to thank Marlyn Jones, District Manager, Harry Lawson and Douglas D. Scott of the Montrose District.

I would also like to thank Jay Boren, Engineering Technician for the Bureau of Land Management, for his help and interest in the people working at Escalante Ruin.

PART III

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Chapter I

INTRODUCTION

In 1975 a project was conceived to excavate and stabilize a ruin on the Escalante Trail near Dolores, Colorado. The ruin was first described by Sylvestre Velez de Escalante in his journal of his historic trip in 1776 to find an overland route from Santa Fe, New Mexico, to California (Bolton 1972: 28). The project was created as part of Colorado's celebration of the Bicentennial of the United States. The site was designated as site number 5MT 2149 by Mesa Verde Research Center surveyors in 1970, but became known as the Escalante Ruin. On 13 August 1976 in Colorado's official ceremony for the Bicentennial, Escalante Ruin was dedicated as a site on the National Register of Historic Places. In conjunction with the excavation-stabilization of Escalante Ruin, a small four-room surface habitation was also excavated and stabilized in 1976. This ruin, 5MT 2148, is called Dominguez Ruin after Francisco Atanasio Dominguez, who was the Franciscan superior of Escalante.

To restore and stabilize both the Escalante and Dominguez Ruins, consideration had to be given to the fact that the ruins would be unattended, there would be visitation throughout the year, and they would be open to the elements. Consequently, materials used for stabilization of exposed areas, had to be strong enough to support visitors, and to avoid deterioration from water and other elements. Both ruins were documented by the requirements set forth in the Handbook for Ruins Stabilization (Vivian and Richert 1962).

This report covers extensively the work achieved during the 1976 field season; it is also a complete summary of the stabilization of Escalante and Dominguez Ruins for both 1975 and 1976. In this report the types of damage encountered, the solutions of this damage and the materials and methods used, are discussed. The Munsell Soil Color

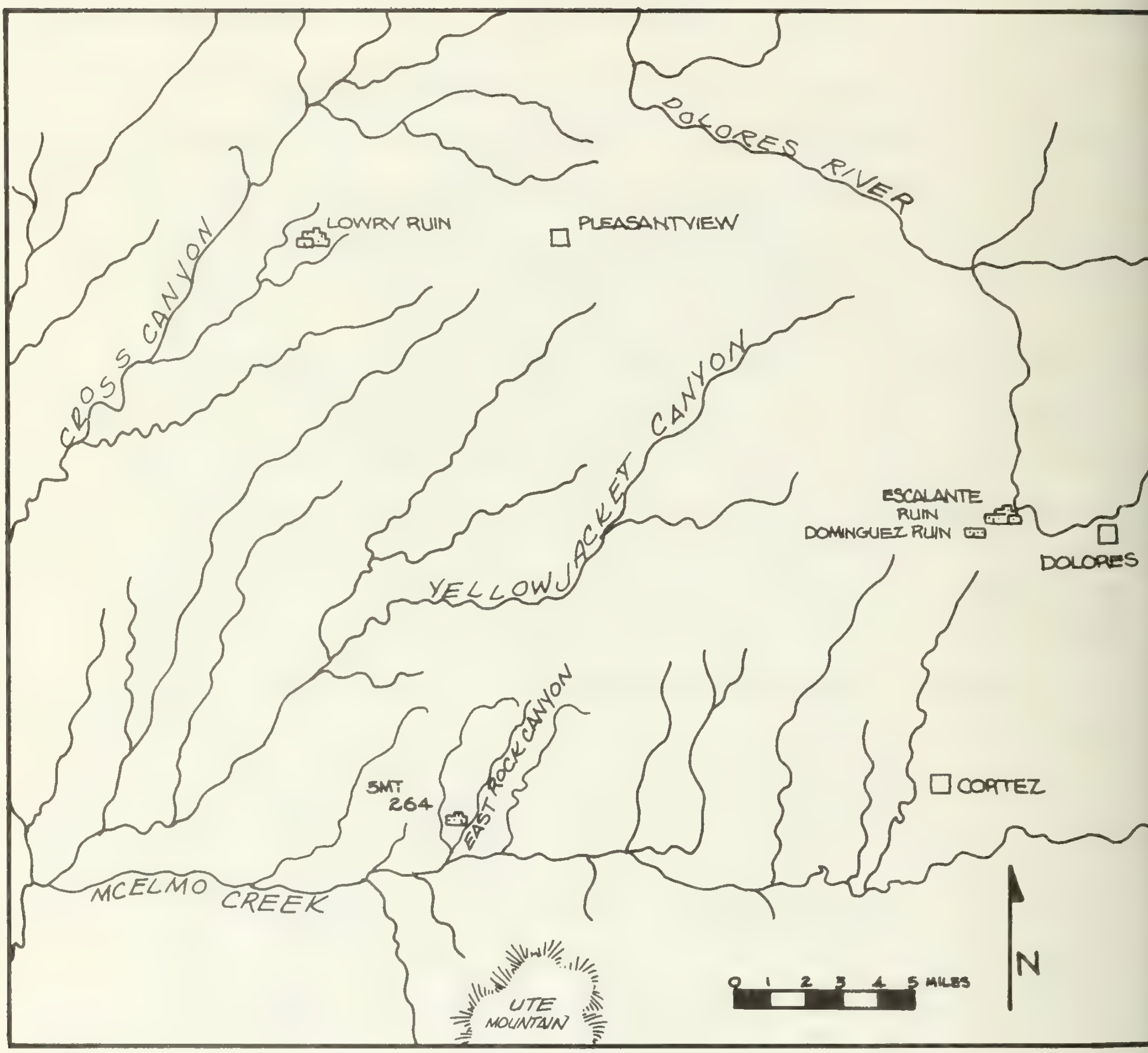


Figure 1. Map of Southwest Colorado

Chart (1971), is used to classify mortar and sandstone colors. When techniques used were the same at Dominguez Ruin, as those at Escalante Ruin, they were not repeated. A material and cost factor section is included in this report to summarize the work at Lowry Ruin, Escalante Ruin, East Rock-5MT 264, and Dominguez Ruin (Fig. 1).

The purpose of this report is more than just to document the stabilization; it is hoped that the publication of reports on stabilization will encourage others involved in preservation to document their techniques unique to their area.

Chapter II

ESCALANTE RUIN

Description and Location

Escalante Ruin is a Pueblo II - early Pueblo III surface Pueblo. Available tree-ring dates, indicate that construction took place in the 1120's and 1130's. The ruin is located about 1500 feet north of Colorado Highway 147, on a hilltop with an elevation of 7200 feet. The Dolores River is to the east. The ruin consists of double rows of rooms on the west, north and east sides. On the south side, there is a single row of rooms. Kiva A is located in the center of the room block. Kiva B is located outside of the room block immediately to the south (Figs. 2-3).

Five rooms (2, 5, 6, 8 and 9) and Kiva A were completely excavated in 1975. Room 3 was partially excavated to outline the south wall and its relationship to the outer walls of Kiva A. Rooms 1 and 4 were partially excavated previously by unknown parties. Rooms 10 and 20 were excavated in 1976 and Kiva B was trenched. The exterior walls of the Pueblo were defined and trenches were dug along the interiors and exteriors of the walls.

Walls

Ninety-eight percent of the walls stabilized at Escalante Ruin are compound with a rubble and mortar core, one percent are single walls, and one percent are compound walls with no core (Hayes 1964:37) (Fig. 4). The range of courses exposed is 12 to 24 for fully excavated rooms. An average of six courses were exposed by the trenching of the outer Pueblo walls. Of the walls stabilized in 1976, 79 percent have excavated bases. The walls that have excavated bases show that large footer stones set in a reddish-brown mortar were used for wall foundations.

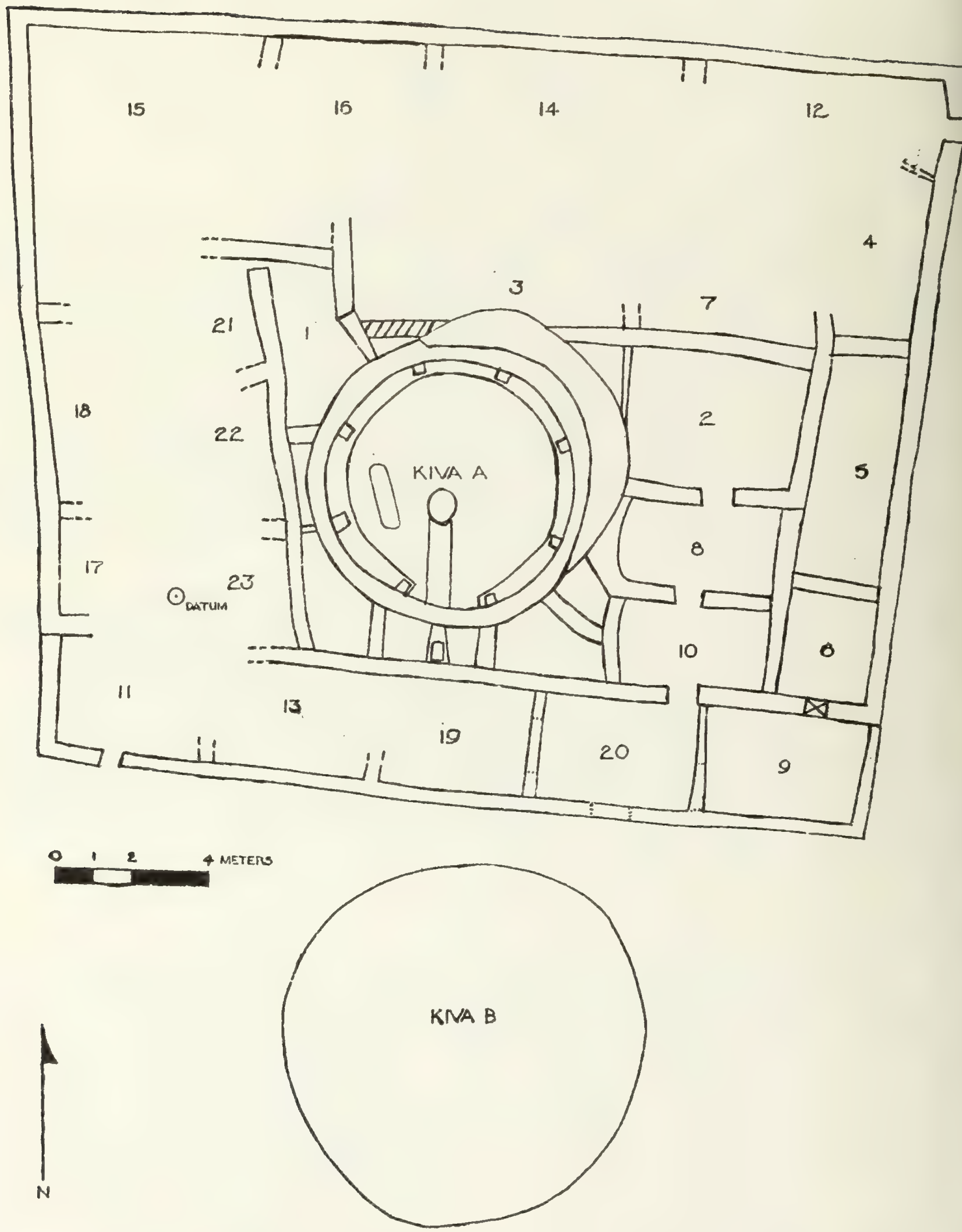


Figure 2. Map of Escalante-Ruin 5MT 2149

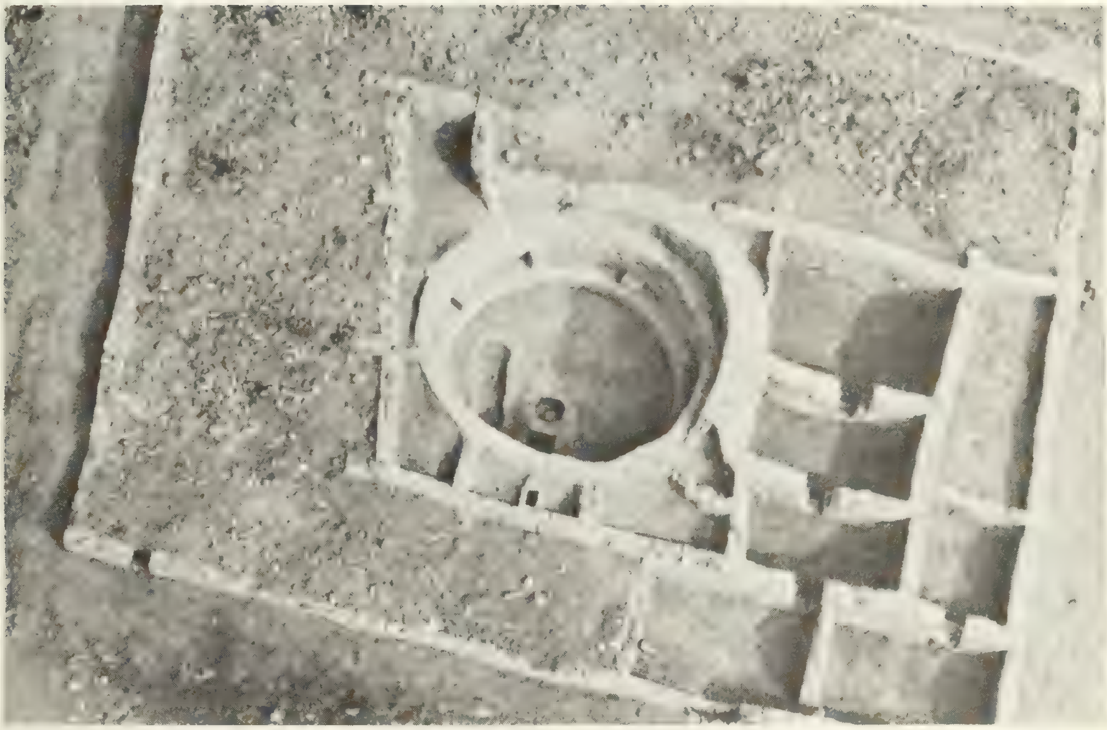


Figure 3. Escalante Ruin - 5MT 2149. After stabilization.

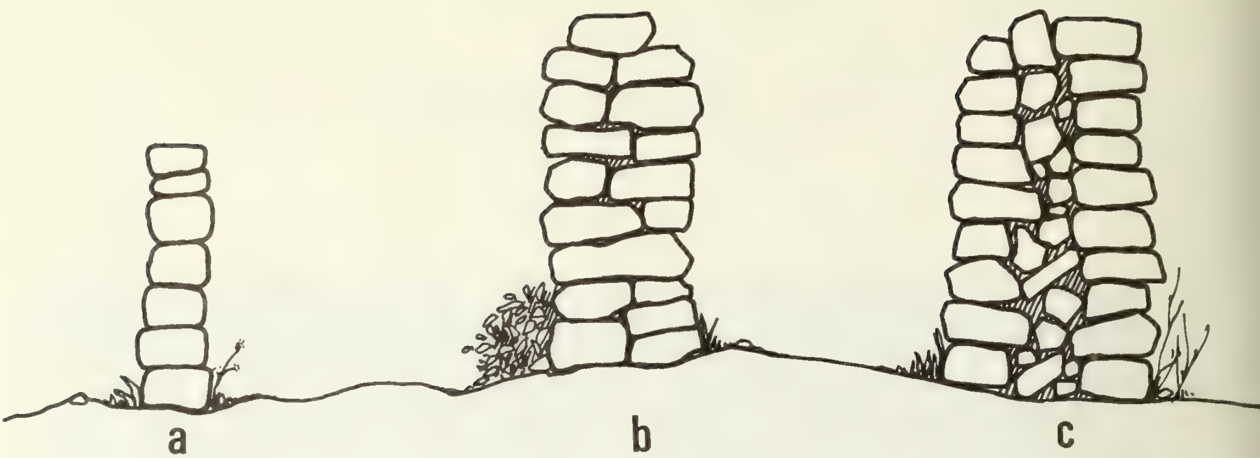


Figure 4. Wall Types. a, single wall; b, compound wall with no core; c, compound wall with rubble and mortar core.

The masonry walls are constructed of sandstone building stones and river cobbles. Five distinguishable sandstone types, and also shale, are utilized as building stones. All types appear to be from the Dakota Layer, which composes the hill on which Escalante Ruin sits. The sandstone would have been easily accessible from outcrops on the north and east sides of the hill above the Dolores River. The river cobbles are found on the hill as part of a Pleistocene gravel deposit. The sandstone is characterized by colors ranging from white to gray with pinkish and yellow hues (7.5YR 6/2, 8/2, 2.5Y 8/2 and 10YR 8/1) to brown (10YR 5/3). Dakota sandstone is carbonaceous of fluvial origin, streaks of iron oxide are common along with clearly visible quartz granules. Of the different types of sandstone found at Escalante Ruin, only two types are in poor condition. One of these is a large-grained sandstone with no obvious streaks of iron oxide present. Where it is used as a building material, it erodes from the walls. The shale building stones are also in poor condition in every instance where they are used in a wall. It is laminated with dark layers of some organic material, possibly close to coal in composition, causing it to split vertically at the points of lamination.

Building stones are shaped and a large percentage are pecked. Some ground building stones are used in the construction of Kiva A. Few

stones are used unshaped, except for those utilized of a particular type of sandstone, that did not fracture well, and some of the small building stones. This particular type of sandstone is bubbly with iron nodules present, which prevents it from spalling well. Chunky and thin slabbed spalls are used as both levelers and true spalls (Roys 1936:127). Occasionally small river cobbles are used as spalls, and in the north wall of Room 9, small pieces of shale are used.

Mortar

Two colors of prehistoric mortar are present at Escalante Ruin. One is a light gray of two slightly different hues (10YR 7/1, 2.5Y 7/2). The other, more prevalent, mortar is brown (7.5YR 5/4). Upon excavation, the gray is consistently in better condition than the brown, and once exposed withstands weathering better. The brown mortar appears to be higher in organic matter, with a high content of fine sand. The gray mortar is a heavy clay. Sources for the brown mortar could have been both from the top of the hill, and/or below the hill where the ground levels out. The source for the gray mortar appears to be in a layer of shale interbedded in the Dakota Layer. It is easily obtained 48 m. downslope, south from the ruin.

Damage

Stabilization immediately followed excavation at Escalante Ruin in both 1975 and 1976, which eliminated the problems associated with excavations that remain open to the elements. We did not have problems such as undermining and mortar bleeding from exposure; thus, the walls at Escalante Ruin remain as high as when excavated.

The problems at Escalante Ruin can either be classed as post-abandonment erosion or can be associated with the subsequent plant growth, which eventually covered the ruin. Some years after abandonment, roofs collapsed destroying sections of the walls and leaving the cores of walls open to exposure. Walls were weakened by capillary and gravitational

water seeping into the cores; lateral separation in the form of bulges occurs when water freezes, separating the two veneers of compound walls (Fig. 5a). At Escalante Ruin there are many instances where bulges have broken out leaving one veneer and the core exposed. These areas are usually small, and do not involve whole walls. Another common problem is caused by the gradual filling of rooms. As the fill level in a room increases, additional pressure is put on upper courses pushing these courses outward. There are several instances where the upper courses overhung the lower courses from 8 to 15 cm (Fig. 5b). Sometimes the pressure of rock and fill inside the rooms pushed the walls over completely. A good example of this is the south walls of Rooms 13 and 19 as seen in Figure 6a. Gravitational slippage and poor footing can also cause external damage.

Practically every wall at Escalante Ruin has some degree of damage from areas sloping inward or outward. Much of this damage is due to the size and depth of the rooms, which do not have the additional support of crosswalls. The east wall of Room 2, as seen in Figure 6b, is a good example of this type of damage.

Plant growth over the ruin caused many problems. The cores of compound walls provided easy access for roots by acting as sources for moisture since capillary action continues as long as the wall exists. The roots opened walls to water and fill causing lateral separation. The north wall of Room 14, as seen in Figure 7a, is completely separated by roots, with the outside veneer almost parallel to the ground surface. Plants with the most destructive root systems are Serviceberry Bush, Pinyon Pine, Gambel Oak, and Yucca.

In 1975, there were few evidences of man-made problems. Damage appeared to be limited to partially excavated Rooms 1 and 4, which incurred bleeding of mortar from exposure over the years.

Greater man-made problems were encountered in 1976, for at one time a radio tower had been located approximately 5 m. north of the mound. Guy lines ran from the tower to the ruin. These guy lines were secured by cement deadman, and can be seen in Figure 7b in the west wall of Room 18.

a.

b.

Figure 5. Wall Damage. a, Room 2, east exterior wall, lateral separation is causing wall to bulge; b, Room 4, east exterior wall, The upper courses overhang the lower due to room pressure.

a.

b.

Figure 6. Wall Damage. a, Rooms 13 and 19, south wall is slumped from fill pressure; b, Room 2, east wall, wall is bulging from lack of support and lateral separation.

Removal of the cement deadman from the west wall of Room 18, involved rebuilding of seventeen courses.

Stabilization

Capping

The majority of the stabilization done at Escalante Ruin was capping. Walls are capped with a minimum three-course cap without rebar reinforcing, and a two to three course cap when rebar is used. A cap consists of taking three courses off the original wall, and relaying these courses with a cement mortar back to the original height.

The daytime temperatures at Escalante Ruin during the summer months range from 75 to 100 degrees Fahrenheit. Rapid loss of water causes cement to shrink, which causes tensile stresses at the drying surface. If this drying occurs before the cement has attained adequate strength, surface cracks can result. This problem resulted in some cracking in 1975.

In 1976, as soon as the cement mortar had hardened sufficiently to prevent texturing, wet burlap bags were placed on the walls. This method worked to slow the moisture loss in the early hardening stage. The walls were kept covered and moist for at least 24 hours and this decreased surface cracks significantly. We did have some cracking in 1976, which could be due to several factors. In hot weather, cracks can develop in hardened cement because of increased shrinkage and the necessity of higher water requirements. The cracks could be caused from volume changes due to cooling from the initial high temperature. Settling could also have caused some of these cracks since all cracks occurred in the caps of walls with unexcavated bases. We used rebar in capping walls in 1976, and it appears to have decreased the amount of cracks in the cap that were caused from settling.

A compromise is always reached when stabilizing a ruin. Safety for visitors has to be combined with presenting the ruin in an aesthetically stabilized form. If care is not taken to blend the stabilized with the unstabilized, it can often distract from the interpretative aspects of

the ruin. Finishing off a cap involves one of these problems. In 1975, we built the caps with flat surfaces that slightly sloped for drainage purposes (Fig. 8a). These caps are safe for people to walk on, and since they are flat invite use. When walls are capped in this manner it presents an unrealistic view of how the ruin looked when excavated. The walls have the appearance of originally being only that high, since they are relatively flat on top. When a room is of a depth that visitors would be injured, if they slipped and fell, flat caps are advisable.

In 1976, we capped the outer walls of the pueblo with rough caps (Fig. 8b). These walls are adjacent to the dirt path encircling the ruin and enclose rooms that remain unexcavated. There is no need for visitors to walk on these walls when they can observe the same aspects of the ruin from the dirt path. In roughing the caps the primary objective was still to avoid water pooling on the walls, freezing, and thus cracking the caps. In order to cap the walls so that they retained the appearance of newly excavated walls, attention was given to details of wall erosion. There are certain patterns that are continually repeated in excavated walls. Sometimes in compound walls, only one veneer and a partial core remains. Most corners at Escalante Ruin were pushed outward, due to fill pressure from within the room creating a stepped appearance. In the cores, fill stones were not always laid horizontally; sometimes they were set in the core vertically. The rough bubbly sandstone was often used for core stones, along with small river cobbles. These factors were taken into consideration when building rough caps. The caps needed to blend in with the unexcavated rooms and yet give the same appearance as when first exposed. As in rebuilding the flat caps, as much stone as possible was exposed minimizing the amount of cement showing. On the rough capped walls, shallow channels were grooved in the cement so that water will flow off the walls.

Patches

There were several areas at Escalante Ruin where it was necessary to remove small areas of weakened and bulging stone. We called these

areas patches, and normally they are caused by lateral separation and extend through one veneer and the core. Small bulges are more common in maintenance stabilization, as they normally occur under the cement mortar cap.

Roots

Roots caused extensive damage in the walls at Escalante Ruin (Fig. 7a). Roots grow through the cores breaking walls open. When a wall is torn down to a stable base in preparation for stabilization, it is sometimes impossible to completely remove roots which continue downward through the core of the wall. In these instances, a herbicide called Pramotol was used to kill the root growth. It was poured at full strength directly on the root. Pramotol was also sprayed in excavated rooms to sterilize the soil.

Drainage

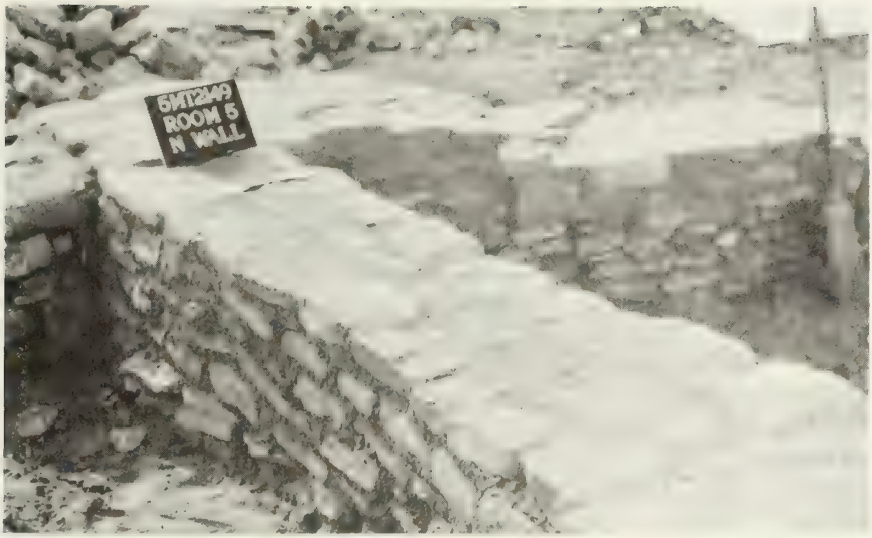
Drainage is one of the most important problems associated with the stabilization of a prehistoric ruin. The construction of Escalante Ruin on a Pleistocine gravel deposit provided good drainage for the ruin as a whole. None of the walls we excavated are built on fill, they are built directly on the river cobbles and clay. Since the ruin as a whole has good drainage, our problems centered around surface run-off into open rooms and Kiva A. We filled all excavated rooms with 5-10 cm of soil above the original floor. Some of the soil was then banked against the walls, allowing all surface moisture to drain to the center of the room, and to either evaporate or sink down through the floor into the underlying river cobbles and clay (Fig. 9a).

Kiva A had more complex drainage problems. A high fill level in Room 3 created surface run-off down the north side of the Kiva wall, resulting in extensive mortar bleeding and loosened stones. To remedy this problem, we built a retaining wall that extends from the east wall of Room 1 eastward to the upper crescent wall of Kiva A. This wall

a.

b.

Figure 7. Wall Damage. a, Room 14, north wall is almost destroyed from root growth; b, Room 18, west wall is extensively damaged from cement deadman.



a.

b.

Figure 8. Wall Caps. a, flat cap of the north wall of Room 5; b, rough cap of the northeast corner of Room 12.

is not a prehistoric wall, but a necessary addition due to the drainage problems (Fig. 9b).

The stabilization of the floor vault of Kiva A in 1975 did not hold up due to the fact that it is a sub-surface feature built of small river cobbles set in clay. The floor vault is dug into sterile soil with a river cobble veneer, resulting in a condition where there is only the soil to bond the veneer. In 1976, we filled the floor vault with soil to within 10 cm of the upper edge. This stabilized the feature and yet still gives the impression of being a sub-surface feature. The edge was also reinforced and built slightly higher than the floor level of the Kiva. The floor of Kiva A was contoured to avoid as much surface water from entering the floor vault as possible.

The firepit and ventilator tunnel were both in poor condition after a year of exposure. Moisture collecting in Kiva A ran into the firepit and ventilator tunnel throughout the previous winter. We solved these drainage problems by rebuilding the ventilator tunnel and firepit. As the ventilator tunnel and firepit were torn down for stabilization, it was found that they were tied in as one structural unit. A drain was made from the firepit through the north wall of the ventilator into the tunnel; this decreased the chances of water setting in the firepit and eventually undermining the walls. The floor of the firepit was rebuilt of mechanic's mesh and cement, and was slightly sloped in the direction of the drainage opening (Fig. 10). The walls of the ventilator tunnel were rebuilt slightly lower than the floor surface. A depth of 5 to 10 cm of fill was added to the floor surface, and banked against the wall of the bench. The entire floor surface was contoured to slope into the ventilator tunnel. The bench surface was also sloped to the outer edge eliminating surface water from setting on the bench surface. The plaster layers originally covering the bench were duplicated by spreading layers of soil cement on the bench (Figs. 11-13).

a.

b.

Figure 9. Drainage. a, view of rooms after surfaces have been contoured to drain water run-off to the center of the room; b, retaining wall above Kiva A.

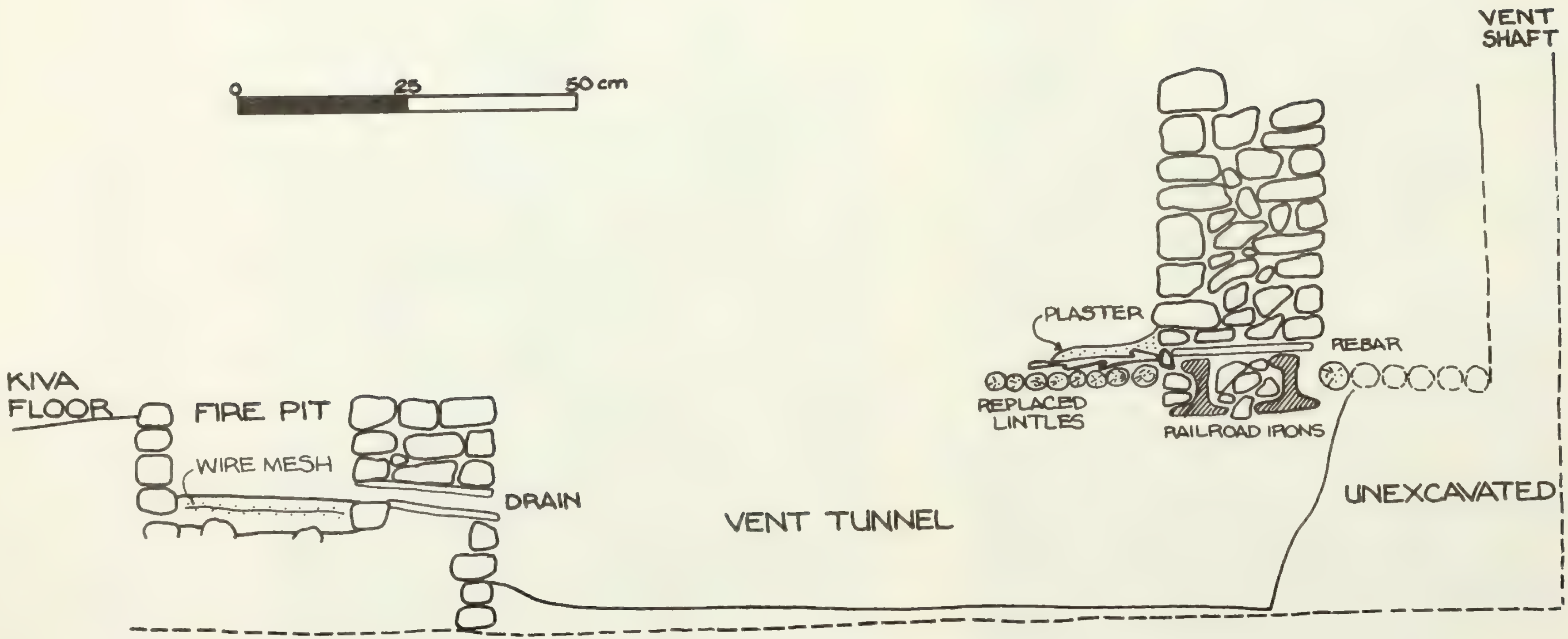
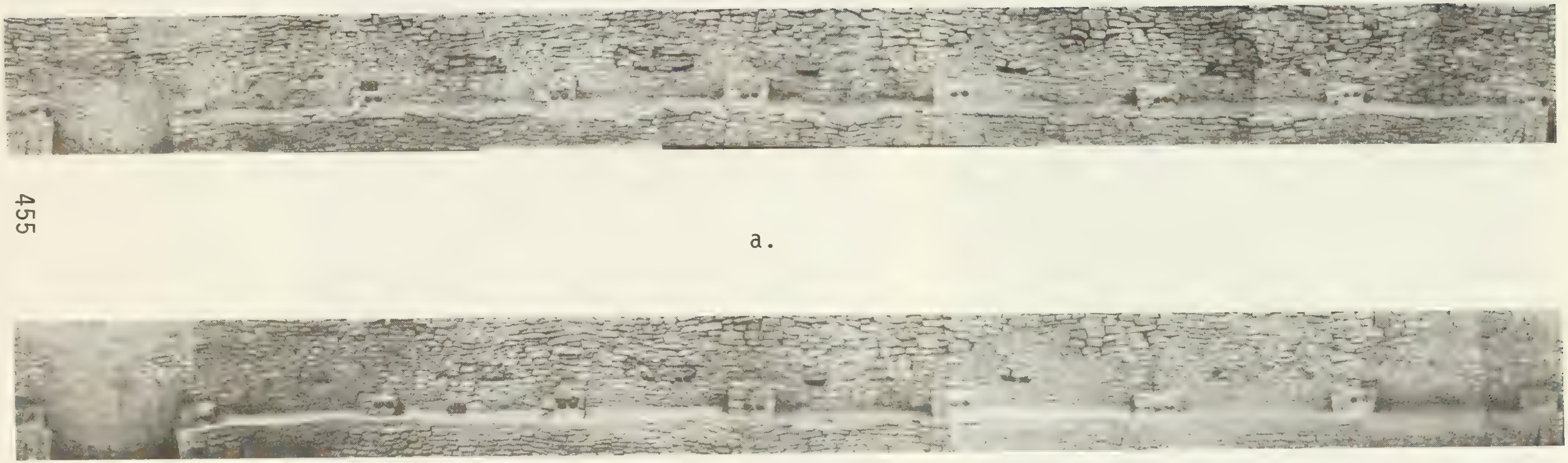


Figure 10. Elevation of firepit and ventilator tunnel of Kiva A



a.

b.

Figure 11. Kiva A, bench. a, before stabilization; b, after stabilization.

a.

b.

Figure 12. Kiva A, firepit. a, before stabilization; b, after stabilization.

a.

b.

Figure 13. Ventilator Tunnel. a, before stabilization; b, after stabilization.

Mortar Duplication

Background

It is necessary to cap prehistoric surface ruins with a cement mortar. A straight Portland Cement mortar has compression strengths of 3,000 to 4,000 lb. per square inch (PCA 1951:1). Although this strength far exceeds the requirements needed for capping prehistoric walls, cement mortar is chosen over masonry cement because of the additional strength needed due to visitor traffic. Unfortunately with the necessary use of cement, problems exist in matching the color of the original mortar. Differences between the prehistoric and cement mortar affect the general appearance, and the interpretative qualities of the total ruin.

During the 1975 field season at Escalante Ruin no attempt was made to match cement mortar with the prehistoric mortar in either color or texture. At that time we were unaware of available commercial color products that would give the colors needed. Matching the yellow and reddish-browns of the Four Corners area has been a well-known problem among stabilizers, since stabilization began.

A Portland Type I and II cement mixed with sand from Shiprock, New Mexico, a natural sharp mortar sand, was used for mortar at Escalante Ruin. Tamm's Light Buff coloring was added to the cement-sand mixture. The coloring acted as a lightener, removing some of the natural blue-green color of the cement and leaving it a light gray. This light gray color, of course, did not match the prehistoric mortar, but it was lighter than the original color of the cement and subsequently easier to stain. If cement mortar is painted with a soil paint, when it is semi-set, it will absorb some of the colored water, resulting in an earthy tint to the cement. How long this coloring will last depends primarily on the composition of the soil used for the paint. When the soil and water are mixed, it should be kept in a liquid state, allowing it to be absorbed by the cement. If applied in the form of a semi-liquid, it will set on top of the cement, and will look good until the first rain and then it will completely disappear.

Mixing

When coloring was mixed with cement and sand, general rules for mixing cement were followed. All dry ingredients were mixed for several minutes before water was added. Ingredients were measured by volume. If it is imperative that each batch of mixed mortar be the exact color, it would be necessary to measure ingredients by weight. The maximum time allowed between the time of mixing and use was two and one-half hours. Mortar not used within this time limit was discarded. Due to the hot, dry weather, the mortar in the box, wheelbarrow, and on the mortar board was kept covered with plastic sheeting, boards and wet burlap bags. All joints were pointed to a depth of 5 cm which decreased the poor effects of having mortar of a different color brought flush to the front of the building stones. Although we were aware of the consequences of using soil mortar to grout with in a surface habitation, we had no other choice at the time, other than not grouting the joints at all. Therefore, our best alternative was the use of a soil mortar of 3:1 and 2:1 proportions; neither combination resulted in a mortar with a hard texture. This problem was partly due to the high organic content of the soil. Kiva A required a gray mortar. As a test, we melted prehistoric mortar from the Kiva walls, and mixed it in a three to one proportion with water. This mortar dried to a hard texture with minimal cracking. This success probably was due to the high clay content of the original mortar.

Soil Cement

Late in the 1975 season, to ascertain the effectiveness of soil cement for grouting joints, a small test was tried on the east wall of the Pueblo. The soil cement consisted of five parts soil, one part sand, and one part regular cement. When the test was examined in 1976, it was observed that there was no cracking, shrinking, crumbling, or pulling away from the joints. The soil cement retained a hard surface and was in excellent condition. These factors greatly advocated the use of soil cement, if a color could be found to match the prehistoric mortar.

To begin our tests, we first closely examined the varieties of prehistoric mortar used at Escalante Ruin. One mortar is classified as a light gray, that is further divided into two slightly different hues (10YR 7/1, 2.5Y 7/2). This light gray was used in the construction of Kiva A, its river cobble buttresses, and also in building the south row of rooms of the Pueblo. The mortar has a high clay content, and becomes slightly glossy when moistened, and observed in its original state. The joints have a very textured appearance, which is partly due to the mortar's natural form of erosion, and of crumbling from the joints in chunks. The same textured appearance results from the granular pieces of undissolved shale, gravel, and other unmixed raw materials. The mortar is in good condition when excavated and retains a hard texture. Most joints in the walls, where this mortar had been used, were still flush with the stone. In the walls where there was erosion, the mortar broke off in chunks, but did not become powdery.

The other, brown mortar is used more extensively at Escalante Ruin. The mortar color is brown (7.5YR 5/4) and has a high fine sand content. When observed in its excavated state, it appears powdery and flakey in exposed areas, but in areas that are unexposed it still remains hard. The areas of Escalante Ruin that were opened to exposure in 1975, and are constructed of the brown mortar, are eroding more quickly than those areas built with the light gray. This mortar erosion is due to the different composition of the original soils used for the mortar.

In conducting the tests for the soil cement, we first took samples of different colors of soil from the immediate area surrounding Escalante Ruin. Seven different colors were found; two of these had hues of light gray, and the other five were varying shades of brown. The samples are color classified with the Munsell Color Chart. Cement requirements are estimated from the Soil Cement Laboratory Handbook (PCA 1971). In the handbook, available data indicates that 85 percent of all soil likely to be used for soil cement can be adequately hardened by the addition of 14 percent cement or less. Fifty percent of all soils tested by their

laboratory require 10 percent cement or less for adequate hardening. We used a mixture of 4 parts soil, 1 part sand, and 1 part white cement which resulted in approximately 16½ percent cement. Generally, the cement requirement increases as the silt and clay content increases. Soils which contain gravel and sand usually require less cement for adequate hardness. The exception to this rule is poor grade, one-size sand materials that may lack any clay or silt (PCA 1971). The soils in hues of brown, selected to test for the brown mortar, are wind blown loess, which falls into the poor grade one-size sand category. The soils gathered for the light gray mortar, are very high in clay, if not totally clay. The addition of one part sand gives both soils more temper.

Samples of soil cement should be at least 6 to 8 cm thick. They need to be this thick to be tested by picking with an ice pick, and/or clicking against a hardened surface, usually an adequate amount of cement has been added (PCA 1971:42). The test is called the Rapid Test Procedure.

The seven soil tests were again tested for color after drying. Five of the samples lightened by one value. Two of the browns had lightened by three values. For both mortar colors, the closest we came to matching was one value lighter than the prehistoric.

Two methods were used to darken and texture the soil cement. To darken the brown, we added two parts of the dark room fill to two parts of the soil, which turned out to be the darkest in the first test. To this mixture we added one part sand, and one part white cement, and this succeeded in darkening the soil cement one value, but increased the gray tones. It was decided to use this mixture to grout the brown mortar areas, although the match was not exact. To blend this mortar in with the prehistoric, we rubbed the soil onto the surface of the mortar, after it had been placed in the joints. The dry dirt clings to the wet soil cement giving it a textured appearance. Although this soil will eventually wear off, it leaves the joint surface textured in a way that cannot be duplicated by the use of a masonry tool.

In 1976, we used a different procedure to increase the bond between the cement mortar and the soil cement grouted into the joints. When

When pointing our joints, instead of scraping the joints out to a depth of 5 cm, we pushed the mortar back into the joint with modified calking trowels. The trowels were modified by rounding off and curving up the tip. This procedure compacted the cement and increased the density of the joints. To increase our bond between the cement mortar and soil cement, we grouted with soil cement after the cement mortar was semi-set.

Color Pigments

We experimented with color pigments at Escalante Ruin in an attempt to reach a color match to the prehistoric mortar in the firepit of Kiva A. The firepit was built with a brown mortar which turned a reddish-brown from heat. The firepit had to be relaid with cement mortar, because of the amount of moisture it would receive. Most commercial color products are produced for flatwork, and for vertical architectural concrete. Thus, adaption had to be made for their use in masonry and subsequently in stabilization. The general guide for pigments used in coloring is (PCA 1951):

Red, Yellow, black, brown	Iron Oxide
Black or brown	Manganese Dioxide
Buff	Synthetic Yellow Oxide of Iron
Green	Chrominum Oxide
Blue	Cobalt Oxide
Blacks	Carbon Pigments and Iron Oxide

Iron oxides are available both as natural and synthetic types, with the natural pigments being lower in cost per pound. Synthetic oxides give brighter shades and less pigment is needed.

The chief pigments we are interested in are the iron oxides. Different shades can be obtained by mixing two or more pigments. Pigments cannot be judged by their appearance in a dry state, due to the greater coloring power of some over others. Manufacturers of pigments will blend various shades to reach a desired color, but a large quantity has to be bought to make this worth the manufacturer's cost. In archaeological stabilization, testing the mortar, surrounding soil, and sand sources, is

an important phase of stabilizing the ruin so the mortar will blend with the prehistoric masonry.

There are conditions to keep in mind when running color tests on cement mortar. Coloring should never exceed 10 percent of the cement by weight. The color of aggregates will affect the color of the cement mortar. Cement is darker when wet, and the more water used, the lighter the final color. White cement causes lighter shades, and regular cement is a graying color. Color pigments must be mixed in a dry state with cement and aggregates for a period of several minutes, when using a cement mixer, and thoroughly mixed if by hand. After water is added the mixing period should be no less than five minutes, possibly longer for pigments which have a tendency to separate. The longer mixing period intensifies the shades. If the pigments are not thoroughly mixed, there will be color bleeding and inconsistency in the colors. An easy test suggested by the Portland Cement Association is to flatten some of the mix under a trowel, if streaks of color are evident, more mixing time is required. Samples of cement should be thick enough (6-8 cm) to give a true test of the actual color. The samples should be kept moist for several days, then allowed to dry under the same conditions as actual work will require. After drying, the sample should be split in half, and the color test made from the inside surface. Frequently a white film can be seen on the surface, this film is called calcium hydroxide or efflorescense, and it will affect the color test.

For the first sample test of the firepit in Kiva A, white cement and three commercial colors were used. These colors were Tamm's Red 2256, Dark Buff 2321, and Chocolate 2607. Mixing the white cement with the Red and Dark Buff separately resulted in two light shades of red (Red 10R 6/8 and Dark Buff 2.5YR), and both were too light and bright. Four more tests were done using regular cement, heavy Dark Buff and varying amounts of Red. A small amount of Chocolate was added to one sample along with heavy Red. The Chocolate added grayer value to both of the samples. Both the Chocolate and Red are strong pigments, requiring only small amounts for coloring. We had no success with the Chocolate, even after extensive

mixing with other dry ingredients in a mixer, because it would rise to the surface when water was added. This may be because this color had carbon pigments added which are finer than the other ingredients, thus separating and rising to the surface. It also produced a lavender cast, which might indicate it has some carbon coloring in it, and consequently would fade in the sun. The sample that most closely matched the prehistoric is the one using heavy Dark Buff with moderate Red. The differences between the cement mortar and the prehistoric mortar are lessened by crumbling the prehistoric mortar and rubbing it into the surface of the wet cement after it is laid.

Contouring

Due to post abandonment falling of walls, the amount of stone against the outer walls was substantial. When the outer walls were excavated the ruin gave the appearance of being built on a mound (Fig. 14a). This appearance was due to the fill against the outer walls gradually sloping onto the ground surface. To present a more realistic view to visitors, the ruin should look as if the walls were covered and continued down below the rubble area.

Several factors had to be considered in contouring the outer edges of the ruin. The area immediately adjacent to the outer walls had to be flat and wide enough for a wheelchair. Ten rooms bordering the outer walls were unexcavated thus putting pressure on the outer walls.

As first steps to determining how to contour Escalante Ruin, test pits were dug to determine the actual height of the wall to its footing. After learning the depth of the fill, a backhoe was used to fill the trenches with stone and fill to the stabilized areas of the walls. The surface adjacent to the exterior wall was leveled for a walkway. The rubble that sloped onto the ground surface was removed up to 3 m. of the walls. This lessened the effect that the ruin was built on a mound (Fig. 14b). The rubble on the west side is wider than on the north or east due to a higher surface indicated on this side. All loose or protruding stones were removed.

a.

b.

Figure 14. Escalante Ruin. a, after excavation; b, after contouring.

The trench in Kiva B was filled with backdirt up to the original depression level. Loose stones were scattered in the depression to give it less of a disturbed appearance. This procedure was done on all areas of the ruin that were disturbed by excavation.

Maintenance

Capping prehistoric walls creates continual maintenance problems. Gradually exposed areas beneath the cap will require grouting due to mortar bleeding. Some water will seep into the walls through capillary action, causing weakened areas sometimes to bulge. These areas, if caught in the early stages, are easily repaired; if they are left to erode they can involve extensive repair.

The entire ruin should be checked for surface drainage problems each year. This annual check includes the resurfacing of room to drain the water to the center of the room. The ventilator tunnel in Kiva A should be closely checked for undermining from water run-off. All the areas above Kiva A should be checked to see that they are not draining in the Kiva. All exposed walls at the ruin should be checked for undermining.

One of the most foreseeable problems at Escalante Ruin will be from root vegetation. The site must be kept clear of scrubby growth as the root growth has and will extensively damage the walls.

Walls should be periodically checked for loosened stones, particularly those walls which invariably will be used as steps by visitors to higher walls.

Chapter III

DOMINGUEZ RUIN

Description and Location

The Dominguez Ruin is a surface Pueblo which is located about 150 yards N-NW of Highway 147, and the Dolores River is to the east. The ruin is oriented in an east-west direction and consists of a single row of rooms (2, 3, and 4) with a room added on to the west (1). Kiva A is located in front of the room block to the south (Fig. 15).

All rooms are completely excavated. Rooms 2, 3, and 4 are constructed of compound walls with rubble and mortar cores. The number of courses remaining is 2 to 6 (30-70 cm). The walls have a footing of a gray clay mortar and river cobbles. The four corners of the room block are L bonds with two crosswalls abutting the north and south walls. The outside walls of the pueblo average 38 cm in width, and the crosswalls are 45 cm in width. Room 1 abuts the south wall of the pueblo. The walls are compound without a core, and they average 28 cm in width. The footing for these walls is of clay mortar. Three to five courses are exposed to 38 cm in height. Kiva A is plasterlined with six stone pilasters. Kiva A was not stabilized due to its deteriorated condition, but it was backfilled.

The masonry walls of Rooms 2, 3, and 4 are predominately constructed of pecked sandstone building stones. Some of the smaller stones used in the walls are shaped. Chunky, thin slab and potsherd spalls are used as true spalls and levelers (Roys 1936:127). River cobbles and unshaped stones are used in the construction of the walls of Room 1. Chunky and small river cobble spalls are used as true spalls and levelers.

Mortar

Two colors of prehistoric mortar are present at Dominguez Ruin. A light gray (10YR 7/1) is used for the foundation footers. Mortar used for wall construction is yellowish-red (5YR 5/6). The sources for these

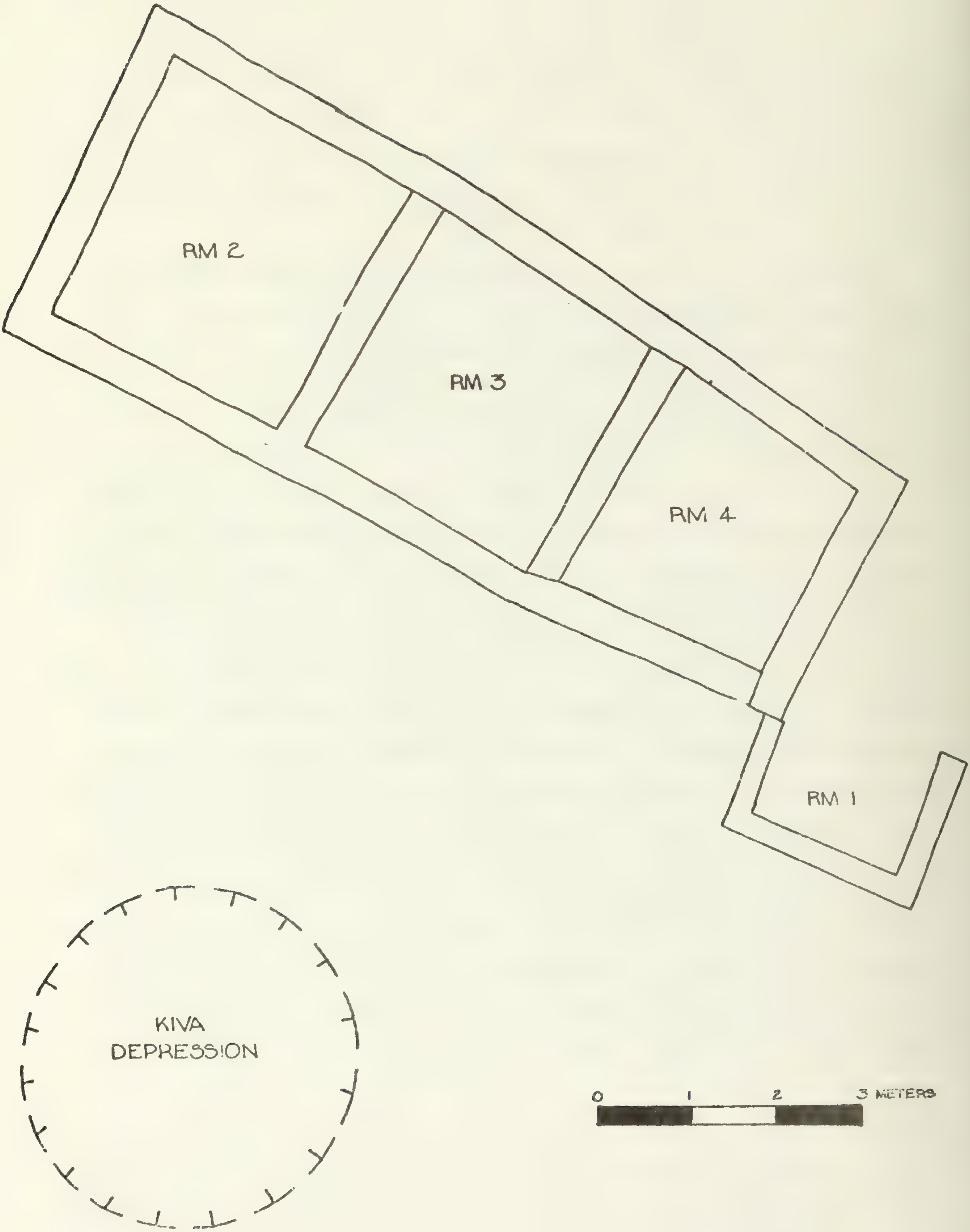


Figure 15. Map of Dominguez Ruin - 5MT 2148

mortars are probably the same as for Escalante Ruin.

Damage

Stabilization immediately followed excavation at Dominguez Ruin. Walls remain the same height as when excavated.

Walls have some lateral separation with resulting bulges, but this is a minor problem at Dominguez Ruin. The main problems center around plant growth. Before the ruin was excavated, Gambel Oak covered the mound (Fig. 16a). The roots had wrapped around building stones and were impossible to remove without dislodging large areas of the walls (Fig. 16b).

Stabilization

The major type of stabilization done at Dominguez Ruin is capping and grouting. Walls are capped with a 2-3 course cap with a tipped rough cap on top of these courses. The walls of the pueblo average about 50 cm in height. A wall of this height does not hinder visitors from looking over the wall. There is no reason to walk on the walls, due to the small room block. In viewing, the only contact visitors will have with the wall, is to lean on it. The top cap is built to resemble as nearly as possible the newly excavated wall (Fig. 17a). To copy the effect of a newly excavated wall, one wall at a time was cleared leaving the other walls as they were when newly excavated for a visual reference (Fig. 17b). In roughly the caps the primary objective was still to avoid water pooling on the walls. In order to match the cement mortar with the prehistoric mortar, all walls were grouted to the ground surface.

Drainage at Dominguez Ruin is a problem due to its location at the base of a hill. Soil is banked against the north wall of the pueblo. A shallow ditch running east-west catches run-off water from the hill above before the water can undermine the north wall. All rooms are filled with 5-10 cm of soil above their original surfaces. Soil is banked against the walls allowing surface moisture to flow to the center

a.

b.

Figure 16. Dominguez Ruin. a, before excavation; b, after excavation.

a.

b.

Figure 17. Dominguez Ruin. a, after stabilization; b, before stabilization.

of the room and evaporate or sink down into the sterile soil. Room 1 is parallel to the road leading to the Escalante Ruin. The road is higher than the room wall. To lower the damage incurred from fill and water run-off, a dry wall was built along the road (Fig. 18a). This wall will not completely remedy the situation, but will lessen the long range effects (Fig. 18b).

Mortar Duplication

In our last weeks of work at Escalante Ruin we acquired a new pigment color. It is called Burnt Umber Oxide BU-5452, and is produced by Pfizer Color Company. We experimented with this new pigment only slightly while at Escalante Ruin, since we only had a few walls left to rebuild that required brown mortar. One important result noted about this coloring is that it turns darker when it dries, instead of lighter as does Tamms Coloring. After acquiring this color pigment, we decided to run tests to see if we could match the prehistoric mortar of Dominguez Ruin. The prehistoric mortar color is a yellowish-red (5YR 5/6), similar to the mortar at Escalante Ruin, although higher in organic matter. For five samples we used 1½ parts regular cement, 1½ parts white cement, and 1 part sand. Our color base was heavy Umber with varying amounts of Red, Dark Buff, and Red and Dark Buff combined. A combination of heavy Umber and heavy Red resulted in a match to the prehistoric mortar. Three tests were done using regular cement and sand in a 3:1 proportion. The color base was still heavy Umber with varying amounts of Red and light amounts of Dark Buff. The same color combination was reached as the prehistoric mortar with the use of heavy Umber, heavy Red and light amounts of Dark Buff. With two combinations resulting in a match with the prehistoric mortar, the most economical one was chosen using the regular cement with no white cement.

a.

b.

Figure 18. Dominguez Ruin. a, Retaining wall above Room 1; b, after clean-up.

Chapter IV

MATERIALS AND COST FACTORS

The Mesa Verde Research Center began stabilization activities utilizing students at Lowry Ruin in 1974. Records were kept on areas stabilized, amount of time, and materials used. This recordation was carried through at the following ruins stabilized by the Mesa Verde Research Center (Fig. 1). The following section is an attempt to summarize the information in these records and to show that these results are affected by many factors. Each ruin will be discussed individually and then, in comparison, in the conclusion.

Lowry Ruin

Lowry Ruin is a surface pueblo with enclosed kivas and double rows of rooms. The ruin was first stabilized in 1965-66. The work done by the Mesa Verde Research Center involved maintenance stabilization and the excavation and roofing of Kiva B (White and Breternitz 1976a). The following list of factors affected the time spent at Lowry Ruin.

Personnel

Lowry had a crew experienced in Southwest Archaeology, but with no previous experience in stabilization.

Records and Photographs

One person was placed in charge of all records and photographs. This appears to be the most efficient way of obtaining necessary information.

Site Preparation

Vegetation was removed so that problem areas were more easily defined. Often these problem areas extend below the ground surface. They seem to be very prevalent in walls with cement caps. If these areas extend below the surface, excavation is required.

Material Availability

Commercial Supplies

All supplies were easily obtained from the nearby city of Cortez, and stockpiled at the site location.

Natural Materials

Building Stones

When Lowry Ruin was excavated in 1936 stone and fill dirt were not separated. This created a scarcity of building stones for stabilization. Those stones that were readily available were used in the initial stabilization of Lowry Ruin. A shortage of building stones in 1974 necessitated excavation in the 1936 backdirt areas.

Soil

Soil for soil mortar was obtained from the backdirt of Kiva B.

Stabilization Techniques

Excavation

A significant increase in time was incurred at Lowry Ruin by the excavation of Kiva B and the rooms providing entry to the kiva. A trench also had to be dug for the drainpipe for the roof of Kiva B, which involved 24 man hours (White and Breternitz 1976a).

Mixing Procedures

The first season all cement was mixed by hand. A power mixer was used the second season. Mixing the soil mortar for repointing joints involved a lengthy process of kneading the mortar.

Masonry

Inaccessibility of repair areas due to height, narrowness, and interior room location increased time spent. When scaffolding was used the work time was increased. Kiva B presented special problems due to the small size of the building stones necessitated by the arc of the circle. Seven pilasters were rebuilt requiring a substantial amount of corner stones. Complexity of masonry style affects the amount of time spent. The size of stones and the thickness of the core affects the amount of cement mortar used.

Carpentry

Due to the size of Kiva B and the rooms surrounding it roof beams had to be long enough to span the diameter, and support the excess weight of moisture, soil and roof materials. These beams had to be special ordered, commercially delivered and finally lifted with the help of a boom truck.

Drainage

All the room surfaces at Lowry Ruin were resurfaced to drain water run-off to the center of the room.

Table 1 shows how the work time at Lowry Ruin is divided as affected by the previously mentioned factors. Since most of the masonry work at Lowry Ruin involved patches and not capping there is no linear measurement of time.

Table 1

Time Estimate-Lowry Ruin

	Hours	Percentage
Masonry	734.53	36
Repointing	188.23	9
Excavation	416.00	20
Carpentry	242.00	12
Misc.	466.00	23
Total	2047.00	100

Average time per stone including repointing time is 45 minutes. Repointing averages out to 22 percent of masonry time. Total masonry time averages 30 hours per cubic meter. The average amount of cement per cubic meter is 74 and 1/4 shovels of sand to 1.23 bags of cement.

Escalante Ruin

Personnel

The stabilization of Escalante Ruin was done at the beginning of the summer field season. The experience of the crew ranged from none to 3 weeks.

Records and Photographs

Individuals kept their own records for the specific wall on which they were working. Although this method of keeping records is beneficial, to students it is not the fastest or most efficient way of obtaining information. Several individuals were in charge of the photographs and this worked well.

Site Preparation

Extensive vegetation had to be removed before and after walls were excavated. Trenches were dug along the interior and exterior of the west, north, and south walls before stabilization could begin on these walls. The fill at Escalante Ruin was very rocky causing a significant increase in time spent excavating.

Material Availability

Commercial Products

All commercial supplies were easily obtained from nearby Cortez and stockpiled at the site location.

Natural Materials

Building Stones

There was no shortage of building stones at Escalante Ruin.

Soil

Soil for soil mortar and soil cement was obtained from various locations near the ruin.

Stabilization Techniques

Excavation

A significant increase in time was incurred at Escalante Ruin by trenching the outer walls.

Mixing Procedures

All cement at Escalante Ruin was mixed by power mixer and carried by bucket and wheelbarrow to job areas. When a wheelbarrow can be filled with mortar, and placed in a central location for several people to use, time is saved. All soil mortar, soil cement and plaster was mixed by hand. It can be mixed in a power mixer with paddles but it is difficult to remove from a blade mixer.

Masonry

Inaccessibility of cap areas due to height, narrowness of trenches and interior room location increased work time and sometimes required scaffolding. The masonry at Escalante Ruin varies from wall to wall and special care had to be taken to match walls. The cores are thick and the building stones are generally small. These two factors increase the amount of cement per cubic meter. The second season the walls were covered with wet burlap while the cement was drying to slow down the hydration process, thus decreasing excess cracking. This practice increases work time. The features of Kiva A took considerable time to rebuild due to their specialized nature.

Carpentry
The vent tunnel is partially roofed for interpretive purposes.

Drainage
All rooms are surfaced to drain water to the center of the room.

Contouring
A backhoe was used to contour the area of the outer pueblo walls. Anytime a backhoe can be used to move substantial amounts of rock and dirt, time is saved.

Table 2 shows the work time at Escalante Ruin for the 1975 and 1976 seasons. In 1975 63 percent of the total time was spent in masonry work with 6 percent in repointing time. Repointing averages 19 percent of masonry time. Thirty-one percent is accounted for in miscellaneous

Table 2

Time Estimate-Escalante Ruin

	Hours		Percentage		
	1975	1976	1975	1976	Overall
Masonry	754.15	1083.00	63	54	58
Repointing	71.00	161.00	6	8	7
Misc.	366.85	756.00	31	38	35
Total	1192.00	2000.00	100	100	100

activity. In 1976, 54 percent of the time was spent doing masonry with 8 percent for repointing. Excavated room walls with both sides repointed averaged 28 percent of masonry time. Those walls with one exterior requiring repointing averaged 15 percent of the masonry time. Miscellaneous activities, which included excavation of outer pueblo walls, increased to 38 percent. Records were not continually kept on excavation time, but

according to the records available, the average time per linear meter is about 3½ hours. Cleaning down a wall before rebuilding averages 1-3/4 hours per linear meter. It takes from 45 minutes to 1 hour to fill out the required forms for each wall. Photos for each wall can take from 15 minutes to 1/2 hour. The average masonry time per cubic meter was 55 hours. Cement mortar per cubic meter was 116 shovels of sand to 1.93 bags of cement. Average time per linear meter is 10 hours in 1975 and 12 hours in 1976.

East Rock, 5MT 264

East Rock 5MT 264 is a three room dwelling in an overhang. The ruin was stabilized in 1975 (White and Breternitz 1976b). The primary objective of the job was to stabilize two painted walls. Below are the factors that affected the job time.

Personnel

This ruin was stabilized at the end of the summer field season. Most workers had had from two to six weeks experience in stabilization.

Records and Photographs

Individuals filled out specific wall descriptions. Elevation drawings were made of the two painted walls. This resulted in an increase of time but presented a useful documentation of specific types of damage that are not clearly seen in photographs. A plan view map was also made.

Site Preparation

Fill had to be removed from particular wall bases in order to assess deterioration.

Material Availability

Commercial Products

All materials, and stabilization equipment had to be backpacked and carried in for a distance of approximately one-third mile, over rough terrain.

Natural Materials

Building Stones

The ruin is unexcavated; the only building stones available for stabilization were those on the

surface. This factor necessitated a lot of hand work in shaping stones.

Soil

Local soil was used instead of sand to make soil cement.

Stabilization Techniques

Mixing Procedures

Soil cement mortar was used for masonry and soil mortar was used for repointing joints. All soil was screened to remove plant material and large pieces of shale. Both mortars were mixed by hand.

Masonry

Most areas were easily accessible. The painted walls required some work from a ladder. The masonry style was not difficult to match. The cores were small which decreased the amount of mortar required.

Other

Rebar was set in the cave roof and in the unstable wall and set with liquid sulfur. This process was quite lengthy. Time probably could have been saved by using expansion bolts.

Clean-up

The only time spent in cleaning up was in the removal of tools and materials and raking for cement pieces and spalls.

Table 3

Time Estimate-East Rock 5MT 264

	Hours	Percentage
Masonry	112	39
Repointing	56	19
Rebar Supports	20	7
Misc.	100	35
Total	288	100

Table 3 indicates hours and percentages from East Rock 5MT 264. The masonry time at 5MT 264 was 39 percent, which is almost equal to the miscellaneous time of 35 percent. The large miscellaneous category is due to the amount of time needed to transport materials and tools by backpack. Repointing is 19 percent, which averages 33 percent of the masonry time. This percentage is high due to the large amount of cracks that were grouted, in addition to repointing newly cemented joints. The rebar supports amount to 7 percent, which strongly points out the lengthiness of this type of stabilization. A 4:1 soil cement combination resulted in 149 shovels of soil, and 1.85 bags of cement per cubic meter. The average amount of time for masonry per cubic meter is 44 hours.

Dominguez Ruin

The following factors affected the amount of time it took to stabilize Dominguez Ruin.

Personnel

This ruin was stabilized at the end of the summer field season. All the workers had from three weeks to five months of stabilization experience.

Records and Photographs

Records were filled out by individuals on specific walls. Photographs were taken by two individuals.

Site Preparation

Massive roots had to be removed from the walls before stabilization. Dominguez Ruin was newly excavated thus eliminating extensive site preparation.

Material Availability

Commercial Products

All supplies were easily obtained from nearby Cortez, and stockpiled at the site location.

Natural Materials

Building Stones

Building stones were abundant and close at hand. Stones required little, if any, shaping.

Soil

No soil mortar or soil cement was used at Dominguez Ruin.

Stabilization Techniques

Mixing Procedures

All cement was mixed by one individual. This procedure lessened masonry time significantly by leaving masons free to continue laying stone without stopping at intervals to mix cement.

Masonry

The walls of Dominguez Ruin were easily accessible, and the height was easy to work. No scaffolding was required. The masonry is of large stones with a small core. The small core and large stones greatly decreased the amount of cement mortar used. The cement was colored to match the prehistoric, thus eliminating repointing. Walls were covered with wet burlap to decrease cracking.

Clean-up and Contouring

All rooms were resurfaced to drain run-off moisture to the center of rooms. A backhoe was used to fill Kiva B in front of room block, and to contour the area surrounding the pueblo.

Repointing was eliminated at Dominguez Ruin, resulting in a total masonry time of 59 percent. Miscellaneous time of 41 percent is suggestive of the amount of time required for a small job such as Dominguez Ruin. The average time per linear meter is 4½ hours and the time per cubic meter is 16 hours. Cement per cubic meter was 57 shovels to .95 bag of cement.

Table 4

Time Estimate-Dominguez Ruin

	Hours	Percentage
Masonry	142.30	59
Misc.	97.70	41
Total	240.00	100

Conclusion

In looking at all four ruins as a whole it can be seen that man hours spent in masonry work account for from 36 to 59 percent of the total time. If repointing is necessary it takes from 7 to 9 percent of the total time. Where excavation is necessary a substantial amount of time should be allotted for this. Any time specialized stabilization such as carpentry or work involving rebar supports time has to be allowed depending on the type of work to be done. Time spent in miscellaneous activities accounts for in most cases as large a percentage as masonry work. The range of percentages for miscellaneous activities is 23 to 41 percent.

The difference in the average man hours taken to rebuild one cubic meter between the ruins discussed clearly points out job differences (Table 5). Experience, accessibility of materials and of the ruin, style of masonry, size of the ruin, techniques used and amount of clean-up and contouring required are the most influential factors affecting man hours.

Table 5

Average Total of Man Hours Per Cubic Meter

	Lowry	Escalante	Dominguez	East Rock
Average Man Hours Per Cubic Meter	30	55	16	44

In conclusion, there is no general rule that will work for all ruins that will say how long it will take to stabilize, or how much cement will be needed. The varied types of jobs done by the Mesa Verde Research Center point this out in the many affecting factors. What may be

considered as a small factor, may make a large difference in the total amount of time that is required to stabilize a ruin, when considering one ruin against another.

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APPENDIX A

Materials, area, and time spent on different walls

at Escalante and Dominguez Ruins.

Escalante Ruin - Materials, Area, and Time

Room	1	1	1	4	4	9	9	10	10	10	11
Wall	north	east	west	north	east	north	south	north	east	west	south
Technique						capping					
Area	.69514	.0081	.4187	.6765	.6177	.7524	1.025	.5217	.4200	.446292	.03857
# Workers	1-2	1	1	1	1-4	1	1	1	1	2	1-3
Cement Mortar Sand	105.75	12	66	3	66	84	42	123	54	39	118.5
Cement	35.25	4	22	1	22	28	14	41	18	13	39.5
Time	50	7	12.35	3	26	11	10	49.30	10.30	10	61.5
Soil Cement # Workers	1	1	1	1	1	1	1	1	1	1	1
Time	8	1	2.25		4	1	2	14	5	3	10
Total Time	58	8	15	3	30	14	12	63.30	15.30	13	71.5

Escalante Ruin (cont.)

Room	11	11	12	12	12	13	13	13	14	14
Wall	east	west	north	east	west	north	south	east	north	west
Technique					capping					
Area	.03857	.66253	2.74312	.38247		.9207	1.9400	.0639	1.4036	.0808
# Workers	1	1	1-2	1-2	1	1-2	1-2	1-2	1-2	1
Cement Mortar Sand	9	69	120	56	12	36	60	10	140	12
Cement	3	23	40	18.66	4	12	20	4.5	46.66	4
Time	4	20.50	36	23	2	9	30	3	45	6
Soil Cement # Workers		1	1	1		1	1		2	
Time		10	4	3		1	4		3	
Total Time	4	30.50	40	26	2	10	34	3	48	6

Escalante Ruin (cont.)

Room	15	15	15	16	16	17	17	18	18	19
Wall	north	south	west	north	west	south	west	south	west	north
Technique				capping						
Area	.99325	.08919	2.1879	1.058	.4155	.17569	.4651	.1518	1.815	
# Workers	1-3	1	1-2	2	1	1	1-2	1-2	1-3	1
Cement Mortar Sand	136	16.5	196.5	219	9	12	71.25	10.50	161.25	75
Cement	45.33	5.5	65.5	73	3	4	23.75	3.50	53.75	25
Time	62.30	9	101	94	8	5	5	15	54	19
Soil Cement										
# Workers	1-3		1-2	2		1	1	1	2	1
Time	13		5	5		1	10	2	4	2
Total Time	75.30	9	106	99	8	6	66	17	58	21

Escalante Ruin (cont.)

Room	19	19	20	20	20	21	22	22	23	23
Wall	south	east	north	south	east	south	south	east	south	east
Technique				capping						
Area	.3732							.52733		
# Workers	1	1	1	1-2	1	1	1	1-2	1	1
Cement Mortar Sand	61.5	24	51	66	33	12	9	63	9	58
Cement	20.5	8	17	22	11	4	3	21	3	19.33
Time	23	10	16	38	6	5	3	32	4	28
Soil Cement # Workers	1	1	1	1-2	1			1-2		1-2
Time	3	2	1	6	2			4		6
Total Time	26	12	17	44	8	5	3	36	4	34

Escalante Ruin (cont.)

Room	Kiva A	Kiva A	Kiva A	Kiva A	Kiva A
Wall	Bench	Fire Pit	Vent Tunnel	Retain. Wall	River Cobble Buttress
Technique					
Area					
# Workers	1-2	1-2	1	2	1
Cement Mortar Sand	114	10.5	42	30	24
Cement	38	3.5	14	10	8
Time	30	4	21	32	5
Soil Cement # Workers	1-2		1	1	1
Time	6		3	3	2
Total Time	36	4	24	35	7

Dominguez Ruin - Materials, Area, and Time

Room	Pueblo	Pueblo	Pueblo	Pueblo					
Wall	north	south	east	west	Crosswall 2-3	Crosswall 3-4	south	east	west
Technique									
Area	5.06	1.92698	.8022	1.07748	.71204	.73012	.259616	.19896	.146832
# Workers	1-5	1-3	1-2	1-2	1-2	1-2	1	1	1
Cement Mortar Sand	150	159	40.5	58.5	49.5	39	9	18	9
Cement	50	53	13.5	19.5	16.5	13	3	6	3
Time	33.30	44.30	11	18	14	12.30	2	4	3
Soil Cement # Workers									
Time									
Total Time	33.30	44.30	11	18	14	12.30	2	4	3

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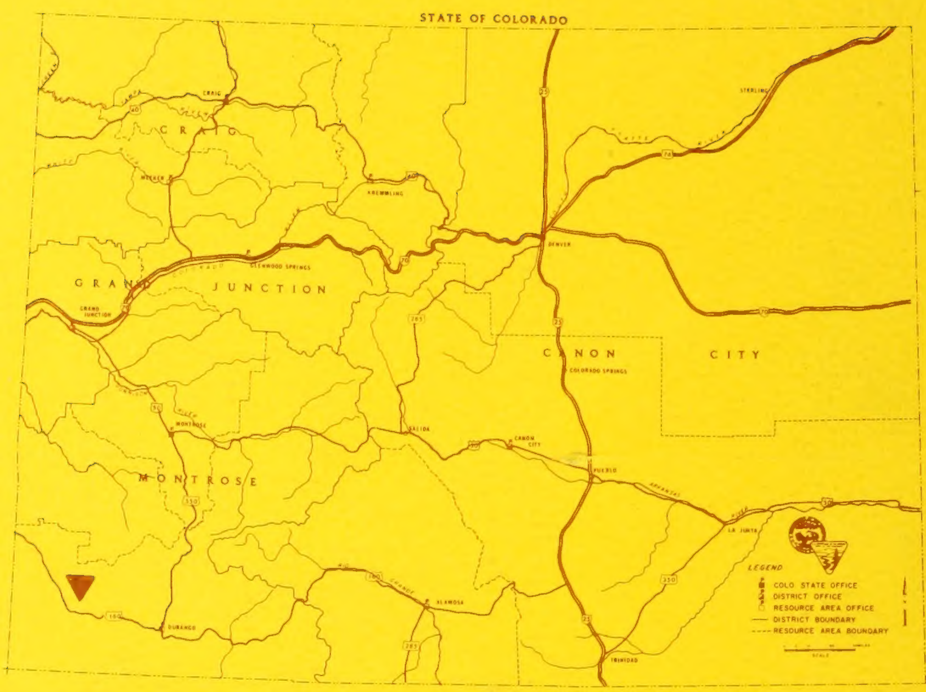

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